PETERSON FIELD GUIDES®

Trees and Shrubs

WATER
(Thin husk, bitter
soft-shelled nut)
SHA
(Thic
PECAN
hin oval husk,
ooth brown nut)
SWEET PIGNUT
(Thin husk,
sweet kernels)

George A. Petrides

George A. Petrides, a veteran field naturalist, is Professor of Fisheries and Wildlife at Michigan State University in East Lansing. He received a Special Award from the federated Garden Clubs of Michigan in recognition of this *Field Guide to Trees and Shrubs.*

A Field Guide
to Trees and Shrubs

THE PETERSON FIELD GUIDE SERIES®

Edited by Roger Tory Peterson

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THE PETERSON FIELD GUIDE SERIES ®

A Field Guide to Trees and Shrubs

Northeastern and north-central United States and southeastern and south-central Canada

George A. Petrides

Illustrations by

George A. Petrides

(leaf and twig plates)

Roger Tory Peterson

(flowers, fruits, silhouettes)

Second Edition

Sponsored by the National Audubon Society,
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and the Roger Tory Peterson Institute

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To

MY MOTHER

and

MY WIFE

Editor's Note

A Field Guide to the Birds, the first book in the Peterson Field Guide Series, was published in 1934 and the principle on which it was founded — a schematic approach pointing out the visual or field differences between species — proved a sound one. Checklist or phylogenetic order was often subordinated to an artificial but more practical arrangement of the figures on the plates. For example, the chimney swift was placed with the swallows and the Philadelphia vireo and ruby-crowned kinglet were compared with the confusing fall warblers.

It was inevitable that a field guide to trees, shrubs, and woody vines should follow. In fact, as far back as 1941 I had planned to do such a book and had actually started on it when I learned that George Petrides was deep in the identical project. Upon examining his work I concluded that his version adhered to the basic principles of the *Field Guide* system even more than mine, so I turned to other projects, offering him bits of supplementary material — tree silhouettes, drawings of fruits and flowers, etc. — that would have gone into my own book. He had based his approach mostly on leaf, twig, and bud characters.

Dr. Petrides, a veteran field naturalist with a record of teaching and research, first in the National Park Service and U.S. Wildlife Service and now at Michigan State University, had long felt the need of an approach to plant recognition that his students in ecology and game management would understand. It is well enough to be tutored in basic plant taxonomy, but more often than not the student even after considerable training is still confused when confronted by many problems of identification.

This *Field Guide* in a sense is a pictorial key using obvious similarities and differences of form and structure by which the beginner can quickly run down his tree, shrub, or vine. True, some botanists may raise their eyebrows because the plants are not in the traditional order of their relationships, but there are many formal botanies so arranged; it would have been pointless to produce another. This guide is a shortcut. Actually the student will learn the relationships too (even if indirectly), for a key in the appendixes makes these quite clear.

The leaf and twig plates are the ingenious and painstaking labor of Dr. Petrides, while the other figures (silhouettes, drawings on legend pages, etc.) are mine. To Devereux Butcher I express thanks for his offer of the use of his photographs of trees, several of which were used as reference material in the silhouette section. I only wish that shortage of space had not prohibited a similar section of drawings of the bark of trees. Had this been included, some of the keys would have had to go. These, particularly the winter keys, were deemed indispensable to the usefulness of the book.

This, the first extensive revision in fourteen years, brings numerous refinements to a *Field Guide* that has already been used by more than 250,000 students, botanists, and amateur naturalists. The plates have been reorganized so as to bear a more convenient relation to the updated text, facilitating quick reference.

In the ecology-oriented years ahead, use this handy book to inform yourself about the green mantle of plants that clothe our "small blue planet," the only home we've got.

ROGER TORY PETERSON

Preface

THERE IS growing concern that man is destroying the environment on which he depends for his prosperity and even for his survival. This is not the place to review the many ways in which not only industrialized but also developing societies are degrading or destroying their necessities of life. However, many of modern man's ills are related to his destruction of plants. The human animal, like all others, is totally dependent on green plants, since these convert inorganic chemicals into organic foods and also help to maintain essential atmospheric gases in a healthful balance.

In any area the presence or absence of certain plant species or their tendencies to increase or decrease may provide indications of the erosion, over-exploitation, or pollution in that particular spot. In addition to their serving as indicators of environmental quality, trees and shrubs also have immensely important aesthetic and monetary roles because of their beauty. If there is any doubt that ecology and economics are interlinked, one can consult a forester, a soils scientist, watershed biologist, wildlife ecologist, fisheries limnologist, or hydrologist. Simpler yet, though, he can ask any real estate broker — or any urban dweller whose separation from the soil has induced a lowered morale.

Learning to know plants, in at least some respects, is like collecting stamps. I can well remember that as a youngster I had no particular interest in acquiring, say, the 1915–18 issues from Afghanistan until somehow I had managed to accumulate about half of them. Then I could not wait to fill in the gaps of the series. In a similar way, one who knows four or five hickories is stimulated to find and identify the others in his locality or even farther afield. Unlike the first few stamps, which can be purchased from a dealer, the first few hickories (or other trees) must be acquired through some real effort on the part of the collector. But with each plant learned the next becomes easier, and soon the enjoyment of wanderings and travels is vastly enhanced by an interest in looking out for new collector's items and the companion plants and habitats with which they are associated.

This second edition offers a reorganized format, making the *Field Guide* easier to use. Many minor improvements that gradually accumulated during the eleven printings of the first edition have all been incorporated here, along with numerous alterations and clarifications. A new key to the hickories has been inserted and one species of ash has been added.

The visual plan that illustrates the features of the five plant groups is now placed more prominently in the front of the book. The reader at a glance can see how the book is laid out.

The plate illustrations have been relocated so that each of the five text Sections is followed by its associated plates, on which there are color triangles in the upper right-hand corners to divide even the closed volume into its five easily found portions. Running heads throughout the book now incorporate the Section number to further facilitate use of the book.

Persons wishing to identify unknown plants often are baffled by botanical manuals and sometimes even by books designed as popular guides. Several obstacles to identification commonly are encountered. First, the technical language used is so involved that it dampens enthusiasm. We shall return to this point later. Second, a "popular" book may not include all species and one is left in doubt as to whether or not his specimen really is the one the book seems to indicate it to be. Third, if one has a book on trees alone or only on shrubs, what is done with a ten-foot woody plant of unknown identity? If it is a young tree then a shrub guide is of no assistance, and if it is a shrub species a tree guide cannot be used. Yet often before one can decide definitely whether it is a tree or a shrub the plant's identity must be known, and so neither book is needed. Fourth, in some books final identification depends on floral characteristics, and the specimen at hand may lack flowers. Or if leaf characteristics are given, then the identification of winter specimens may not be provided for.

It is hoped that this *Field Guide* avoids these obstacles (1) by limiting the use of technical terms, as discussed later, (2) by including all wild woody species in the area covered, (3) by treating trees and shrubs as well as woody vines in the same volume, and (4) by stressing characteristics of twigs and leaves which are present the year round.

The book essentially is a diagrammatically illustrated field key with accompanying text descriptions. It does not provide technical botanical descriptions of either vegetation or flowers. Such treatments are available elsewhere. This volume for the most part describes characteristics essential to the identification of unknown plants in both summer and winter conditions, plus some secondary characteristics considered desirable to confirm identification.

The area treated is the northeastern and north-central United States and southeastern and south-central Canada. It extends in the north from Newfoundland and islands of the Gulf of St. Lawrence along the 49th parallel to northwestern Minnesota. On the west it follows the western boundaries of Minnesota and Iowa and thence along the 96th meridian to include eastern Nebraska and Kansas. To the south the border is the southern boundaries of Virginia, West Virginia, Kentucky, Missouri, and eastern Kansas. Eastward it is limited by the Atlantic Coast.

Within this area all native trees, shrubs, and vines whose stems are woody, as well as those of foreign origin which regularly survive and reproduce successfully there, are considered.[*] The only exceptions are the brambles (*Rubus*, *Rosa*), and the hawthorns (*Crataegus*), whose many species and hybrids are not always identifiable even by specialists. Examples from these groups, however, are discussed. Botanical varieties and forms beneath the rank of species are not considered unless they differ from the typical species to such an extent that they may create confusion in identification. There are 646 species in 186 genera discussed, including 17 in the above three genera. In addition, important varieties are identified; seven are sufficiently distinct to be given separate accounts.

Beyond the described area, this manual still should be useful in identifying species that are distributed more widely. The extent to which each species ranges throughout North America (north of Mexico) is given.

The area, the scientific names used, and the woody species considered are the same as in *Gray's Manual of Botany*, 8th ed., by Merritt Lyndon Fernald (New York: American Book Company, 1950). Although Fernald is a standard technical reference for the area, not all botanists agree with his treatment of some plant groups. There might have been some advantages in adopting the analyses of special groups by other authorities, but it was felt that the disadvantages in possibly confusing the average reader with a battery of synonymous scientific and common names outweighed any benefits. Where technical data beyond those necessary for ordinary field identification are desired, it is thus possible to make direct use of Fernald's manual by merely looking up the scientific names used here.

With further regard to terminology, the following description is a concocted one but is not unbelievably extreme: "Stoloniferous shrub; leaves subcoriaceous, cuneate-ovate to lanceolate, denticulate, glabrescent; twigs terete, glaucous; buds glabrous or glutinous, divaricate, acuminate; inflorescence a thyrse-like panicle, pubescent during anthesis; flowers polygamodioecious, 9-merous," etc. It is sometimes claimed that anyone seriously interested in the subject will be willing to learn such terminology. And it is true that certain terms are necessary to prevent unduly long descriptions, but this is not so for others. There seems little point to describing a leaf shape as "cordate," for instance, when a botanical glossary defines the word as merely meaning heart-shaped. One might as well say heart-shaped from the beginning. Similarly, "stoloniferous" means with runners, "coriaceous" is leathery, "cuneate" means wedge-shaped, "ovate" is egg-shaped, "lanceolate" means lance-shaped, "denticulate" is with fine teeth, and so on. Many botanical terms can be translated easily into plain English with no loss in accuracy. This book uses a simplified terminology, trusting that new interests in plant identification will be encouraged thereby. Where one attempts to avoid technical language, however, the danger of oversimplification and loss of accuracy arises. It is hoped that a satisfactory compromise has been made on this point.

---

[*] Some partly woody plants of general interest are included, but such largely herbaceous plants as canes (*Arundinaria*), Buckwheat-vine (*Brunnichia*), Salt-wort (*Salicornia*), False-spirea (*Sorbaria*), Kudzu-vine (*Pueraria*), Rue (*Ruta*), Pachysandra (*Pachysandra*), prickly-pears (*Opuntia*), Diapensia (*Diapensia*), Pyxie-moss (*Pyxidanthera*), periwinkles (*Vinca*), Climbing-dogbane (*Trachelospermum*), Gutierrezia (*Gutierrezia*), and wormwoods (*Artemesia*) are omitted. The yuccas (*Yucca*) technically have woody stems, but there is no erect or visible trunk or branches; the nonflowering parts of the plants are completely covered by long bayonet-shaped leaves.

It was while I was serving as a naturalist with the National Park Service that the need for a recognition volume on trees and shrubs first became apparent to me, a volume planned in the schematic tradition of the Peterson Field Guide Series. Even before that, the late Professor W. C. Muenscher had stimulated my interest through his fine course in woody plants at Cornell University. His *Keys to Woody Plants* (Ithaca, New York, 1950) still is exceptionally good.

I wish to express my most sincere appreciation to Dr. George W. Parmelee, Curator of Woody Plants, Michigan State University, for his painstaking review of this work and for his many excellent suggestions. Very considerable help was given by Dr. Roger Tory Peterson, who contributed much to the book as editor of text and artwork and supplied the tree silhouettes as well as the drawings of flowers and fruits that appear on the legend pages. Miss Helen Phillips of Houghton Mifflin Company has devoted many hours to careful crosschecking and editing; she has worked on both editions and I am most appreciative of her generous help. I am grateful also to Drs. John Cantlon, Carleton Ball, Leslie Gysel, and Anton de Vos, who each contributed several helpful ideas. My thanks are due to the authorities in charge of the herbaria at the Smithsonian Institution, University of Georgia, University of California, Ohio State University, Texas A & M College, and Michigan State University who made their facilities available. Mrs. E. Musser assisted with lettering originally planned for the book. My mother encouraged my efforts, and my wife Miriam also devoted many hours of assistance in the preparation of the manuscript.

GEORGE A. PETRIDES

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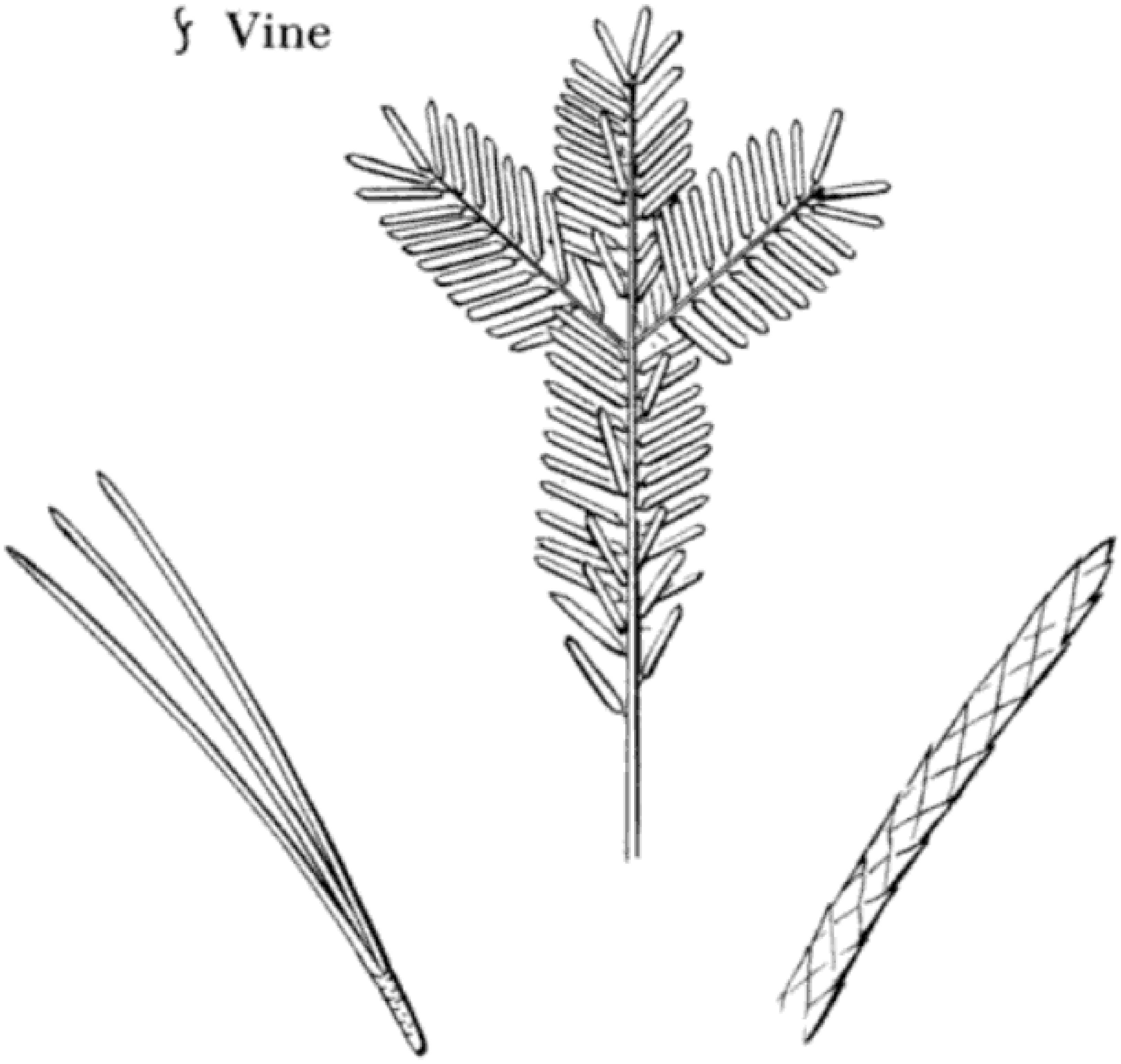
Illustrated Plan of the Five Main Sections

The plants are divided according to the types and arrangements of leaves diagrammed on these two pages. Details of leaf shapes, etc., are considered in each Section.

The green color was provided to aid identification by emphasizing leaf shape; it does not represent the precise shade of green of the plants.

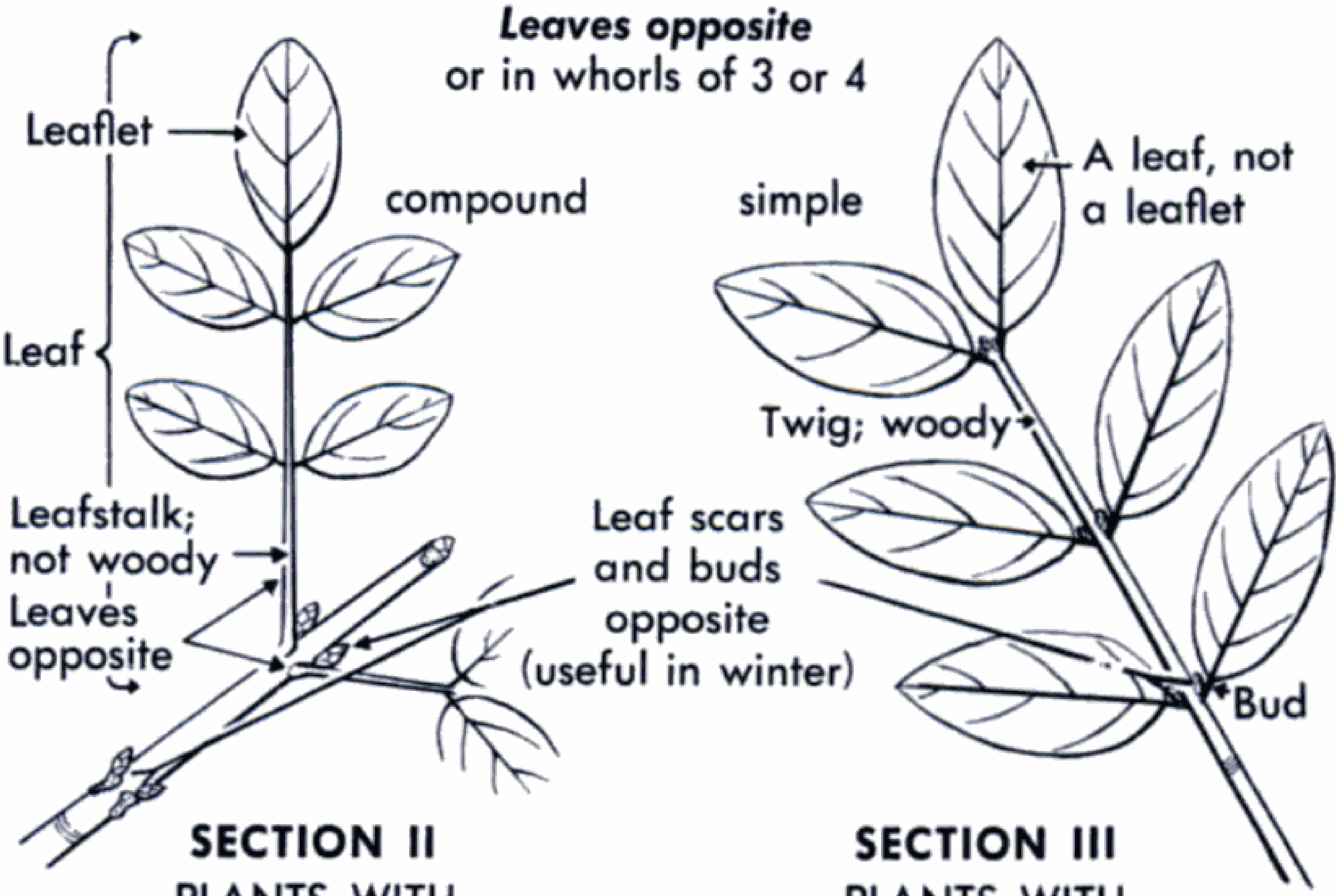
> Note: For convenience in quick reference the following symbols are used opposite the plates.
>
> ↑ Tree
> ↑Ψ Small tree or shrub (may be either)
> Ψ Shrub
> ʃ Vine



SECTION I

PLANTS WITH
NEEDLELIKE OR SCALELIKE LEAVES
Plates 1–6, pp. 32–45. Text p. 15

Leaves opposite
or in whorls of 3 or 4


Leaflet
compound
Leaf
Leafstalk; not woody
Leaves opposite
Leaf scars and buds opposite (useful in winter)
simple
A leaf, not a leaflet
Twig; woody
Bud

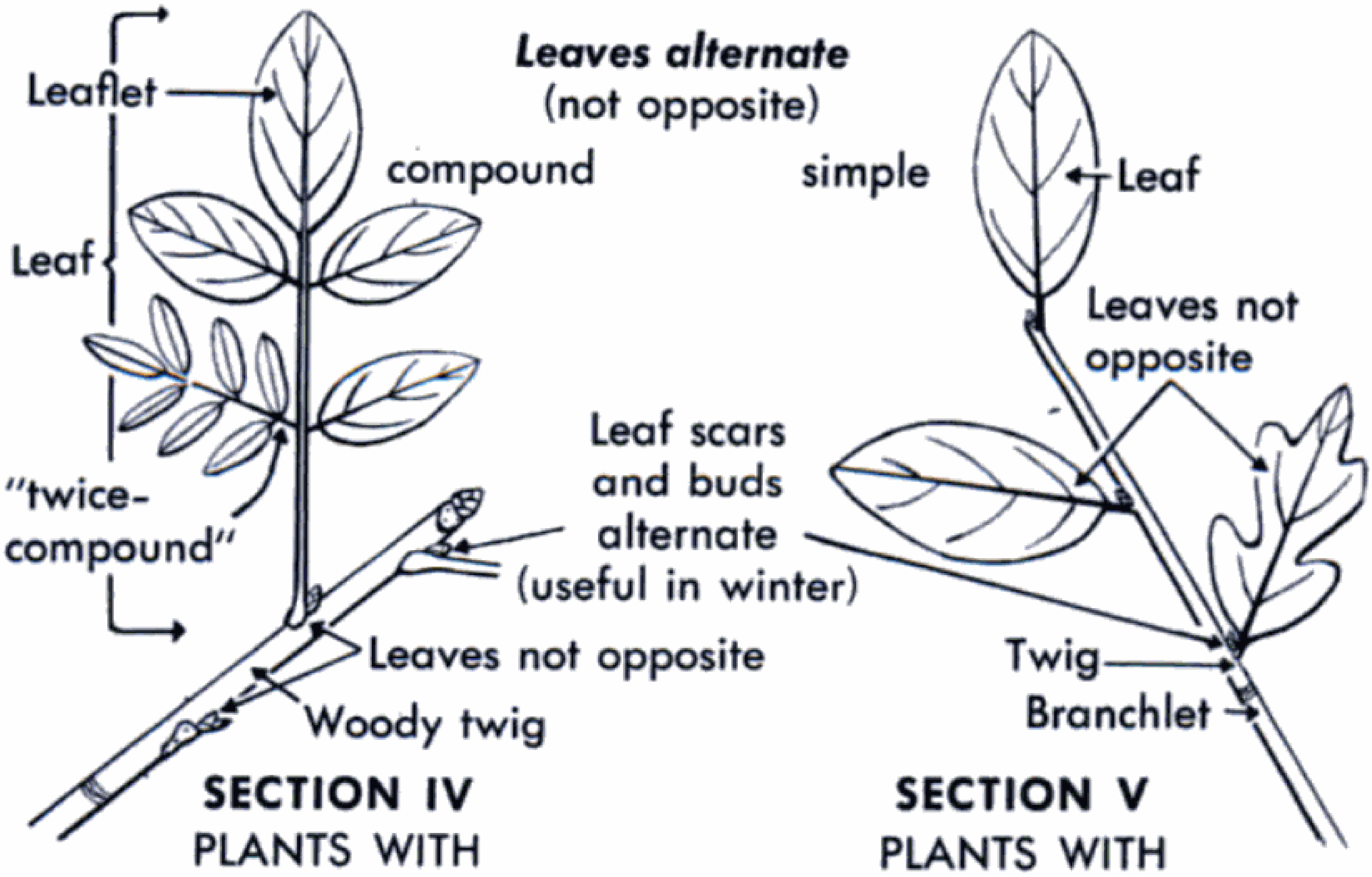
SECTION II
PLANTS WITH
OPPOSITE
COMPOUND LEAVES

Plates 7–11, pp. 55–65
Text p. 46

SECTION III
PLANTS WITH
OPPOSITE
SIMPLE LEAVES

Plates 12–22, pp. 99–121
Text p. 66

Leaves alternate
(not opposite)


Leaflet
compound
Leaf
"twice-compound"
Leaf scars and buds alternate (useful in winter)
Leaves not opposite
Woody twig
simple
Leaf
Leaves not opposite
Twig
Branchlet

SECTION IV
PLANTS WITH
ALTERNATE
COMPOUND LEAVES

Plates 23–31, pp. 149–167
Text p. 122

SECTION V
PLANTS WITH
ALTERNATE
SIMPLE LEAVES

Plates 32–68, pp. 297–371
Text p. 168

How to Use This Book

GENERAL LAYOUT

THE BOOK is divided into five principal sections:

I. Plants with needlelike or scalelike leaves.
II. Plants with opposite compound leaves.
III. Plants with opposite simple leaves.
IV. Plants with alternate compound leaves.
V. Plants with alternate simple leaves.

Sections II–V contain the broad-leaved plants.

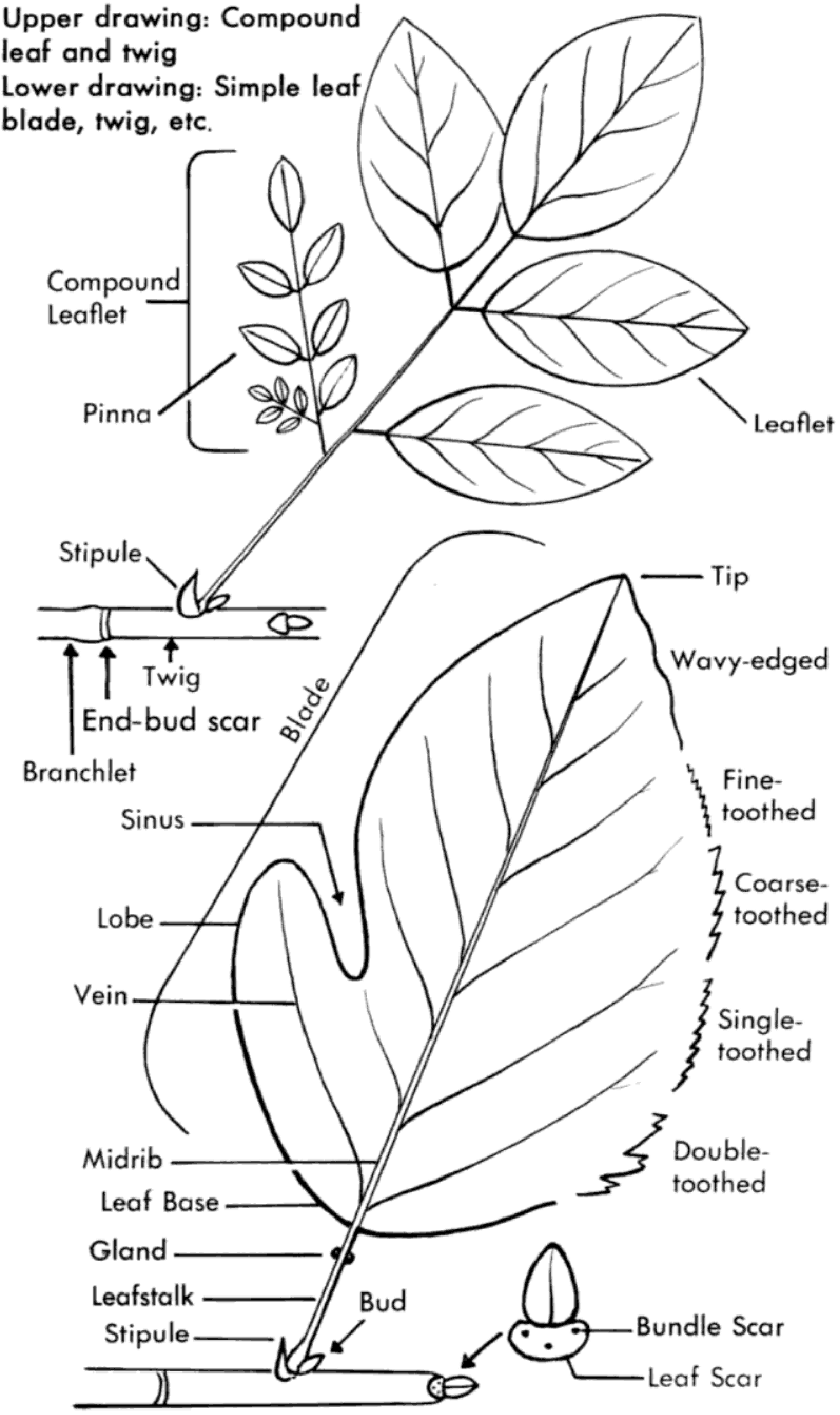
The five basic leaf types and arrangements are illustrated on pages xvi–xvii. They can be learned in a few minutes. In summer, plants can be easily assigned to one of these sections. In winter, plants without leaves can be placed in the combined opposite-leaved (Sections II and III) or alternate-leaved (Sections IV and V) categories according to leaf-scar arrangements (see drawings of leaf types and arrangements preceding the plates in each Section, pp. 55, 99, 149, 297).

Keys, which are explained below under "Identifying Unknown Plants," further assist in identifying species in summer. Winter keys to all nonevergreen species are to be found in the Appendixes and deal respectively with plants with opposite leaf scars (Appendix A) and alternate leaf scars (Appendix B). Additional keys are provided as Appendixes C and D. These should be useful in identifying plants that obviously are trees, being 25 feet or over. A summary of family and other relationships of woody plants is provided as Appendix E. The meanings of some terms are summarized in Appendix F. Appendix G permits conversion of inches to millimeters.

LEAF TYPES

In leafy condition, all woody plants fall into one of the five major categories described above under "General Layout" and illustrated in the drawings on pages xvi–xvii.

Plants whose leaves obviously are not needlelike or scalelike are *broad-leaved plants.*


Upper drawing: Compound leaf and twig
Lower drawing: Simple leaf blade, twig, etc.
Compound Leaflet
Pinna
Leaflet
Stipule
Twig
End-bud scar
Branchlet
Blade
Tip
Wavy-edged
Fine-toothed
Coarse-toothed
Single-toothed
Double-toothed
Sinus
Lobe
Vein
Midrib
Leaf Base
Gland
Leafstalk
Stipule
Bud
Bundle Scar
Leaf Scar

LEAF AND TWIG TERMINOLOGY

Compound leaves are those divided into three (rarely two) to several dozen *leaflets.* The leaflet of a compound leaf is attached by its stalk to a midrib, or rachis, which is not especially woody, and there is only an indefinite mark on the midrib when the leaflet is plucked. The midrib is attached to the woody twig and leaves a definite *leaf scar* (see drawing, p. xxiv) on it when picked.

A *simple leaf* has only a single leaf blade and is joined by its stalk to a woody *twig.* It leaves a distinct leaf scar when plucked.

Both compound and simple leaves may vary in shape, size, texture, and other characteristics, but despite all variations, these two main leaf types are fundamental.

Opposite leaves are of either compound or simple type and occur in opposing pairs along the twigs. Less frequently, *whorled leaves* may occur where three or more leaves arise together and their attachments tend to encircle the twigs at intervals. Plants with opposite and whorled leaves are grouped together in this volume.

Alternate leaves are arranged singly at intervals along the twigs. One should be cautious of misidentifying the opposite leaflets of some compound leaves, even of alternate compound leaves, as opposite simple leaves. Also, some alternate-leaved plants bear *spur branches,* on which leaves are densely clustered (see p. 310). These can be mistaken for opposite or whorled leaves if one is not careful to select strong-growing specimen twigs for study (see "Identifying Unknown Plants").

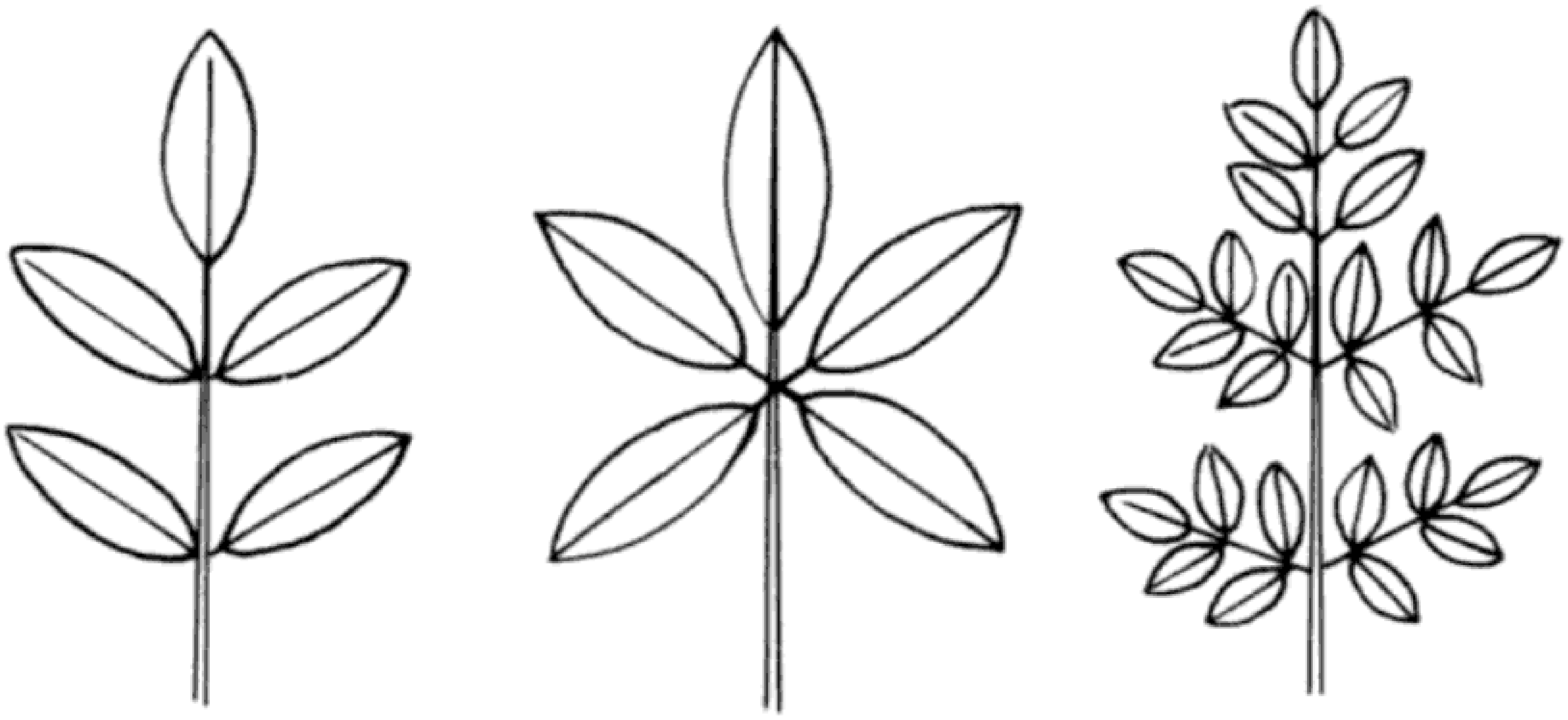
Leaflets of compound leaves and simple leaves both have essentially the same parts. Similarly, the various leaf shapes may occur in both. Leaf shape within each species usually varies considerably. Fewer major shapes are named in this book than in most technical manuals. The comparative drawings, page xxii, illustrate common leaf shapes.

Other leaf characteristics are described or illustrated where encountered in the book.

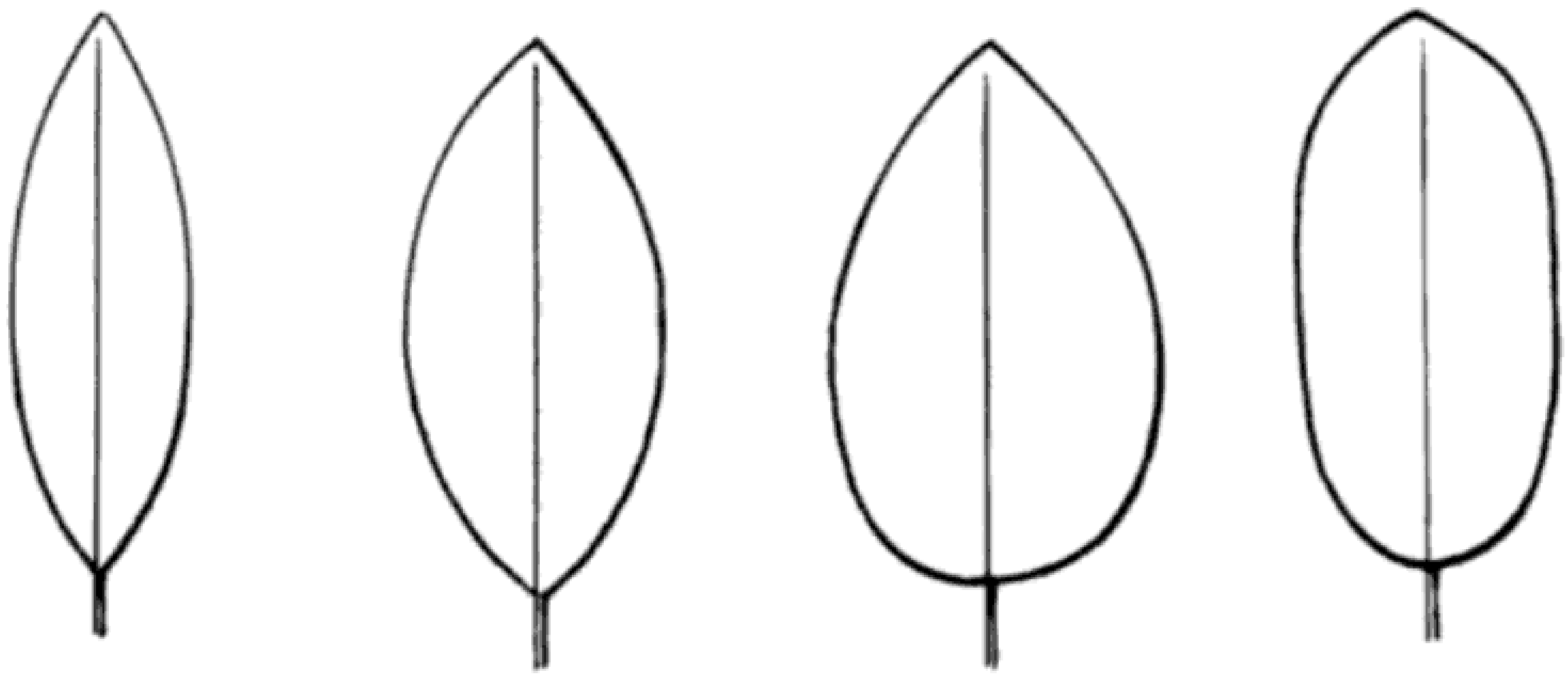
TWIG AND BUD TYPES

A *twig* is not just any small division of a branch. It is only the end portion, the part that constitutes the newest growth. It is separated from the *branchlet,* which is the previous year's growth, by a series of encircling *end-bud scars.*

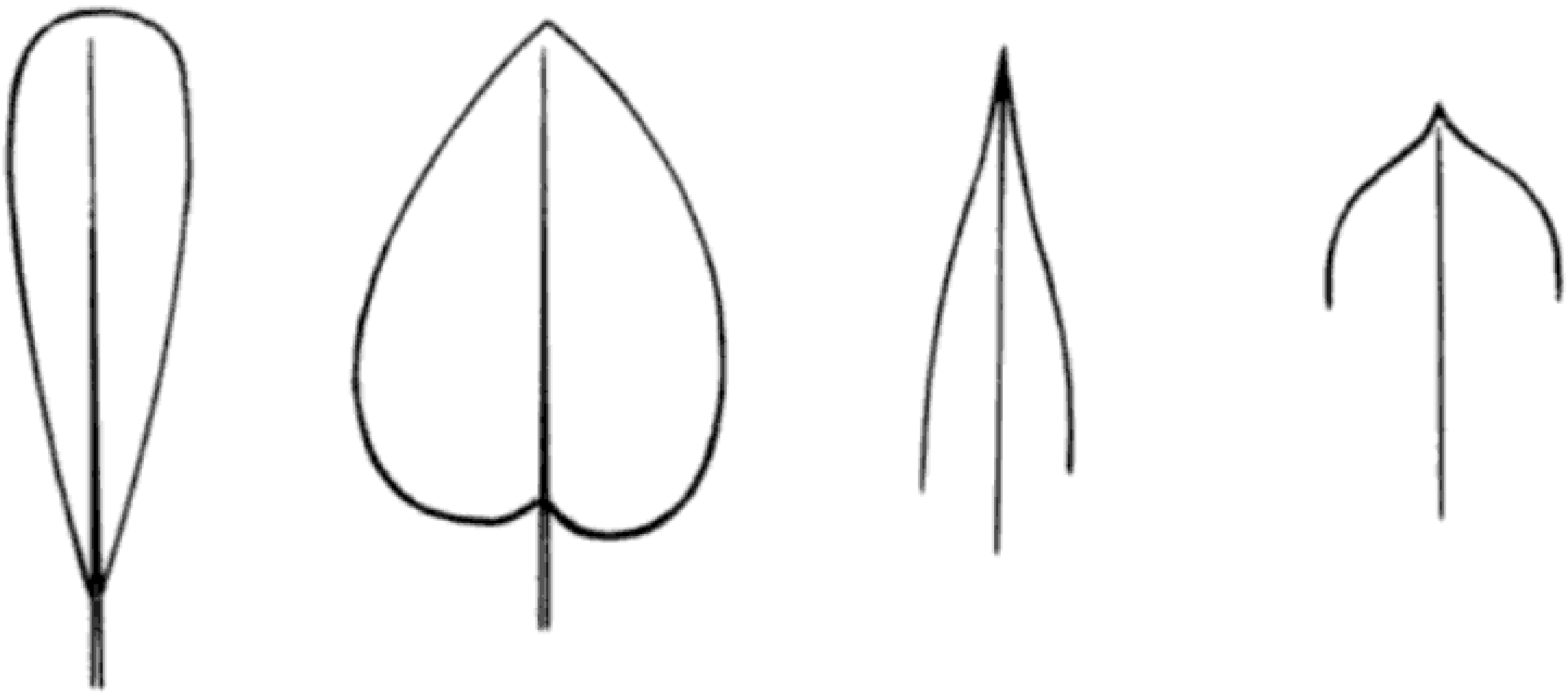
In winter, *nonevergreen* broad-leaved plants make up two main groups: (1) those of Sections II and III, with leaf scars arranged on the twigs in opposing pairs, or, much less commonly, in whorls of three or four, and (2) those of Sections IV and V, with leaf scars arranged singly on the twigs in a more or less scattered pattern. These positions are illustrated on pages xxiv and xvii. Some alternate-leaved plants have spur branches on which leaf scars are densely crowded, appearing opposite or



Feather-compound Fan-compound Twice-compound



Narrow Elliptic Egg-shaped Oblong



Wedge-shaped Heart-shaped Long-pointed Short-pointed

LEAF SHAPES

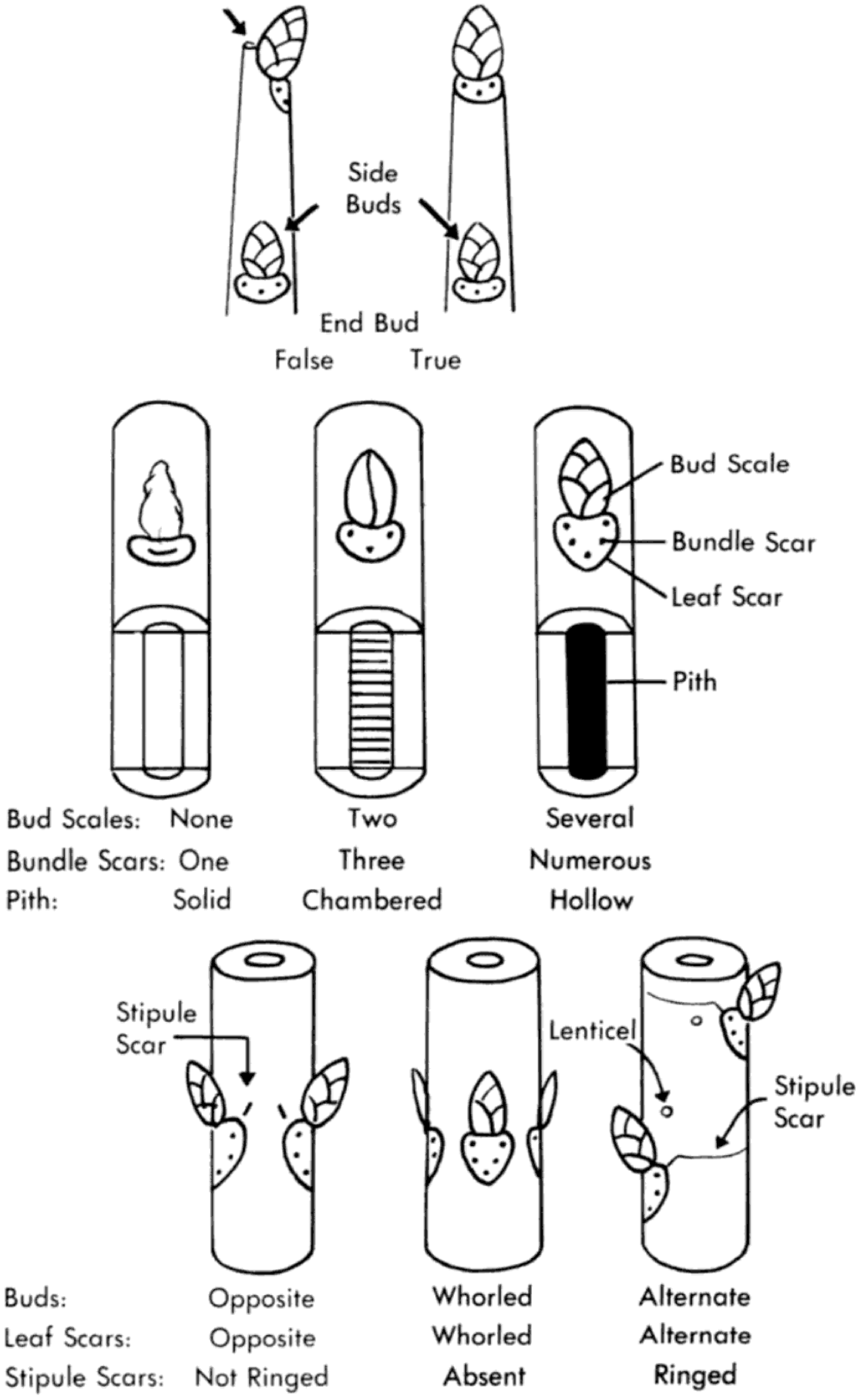
whorled. Spur branches can be recognized as such or avoided by selecting quick-growing twigs for study (see "Identifying Unknown Plants," p. xxvii).

It is not always possible to distinguish between leaf scars of compound leaves and those of simple leaves, though often those of compound leaves are larger and have more than three bundle scars. Further subdivisions within the opposite or alternate-leaved groups depend on the number of bundle scars, occurrence of true or false end buds, type of buds, type of pith, presence of milky sap, and other characters. True end buds and clear sap may be considered to be present unless statements are made to the contrary (alternate references to end buds present or absent correspond with end buds true or false, respectively). Central end buds are lacking in several species with opposite buds (as shown on Plate 8). Bud descriptions apply to mature winter buds. The term *pith chambered* is used here to include all types of segmented, transversely divided pith, including those diaphragmed and partitioned. The main characteristics of winter twigs and buds are shown on page xxiv. Unless otherwise specified, references to bark characteristics apply to the trunk bark.

DRAWINGS

The plates are located at the end of each Section for convenient use with the text descriptions in the five main parts of the book. They are diagrammatic illustrations, indicating the principal identification points of most species. The diagrammatic form avoids the possibility of minor individual differences in specimens being interpreted by the reader as identification points. Occasional dotted lines indicate varying leaf shapes in some species. The reader will recognize that not all specimens will look precisely like the drawings, but they will possess the designated critical points of identification as well as unpredictable irregularities not necessarily of value in identification. Stipules (p. xx) are illustrated only where they are of diagnostic value, since they often drop off easily. The green color was provided to aid identification by emphasizing leaf shape; it does not represent the shade of green of the plants.

Each plate attempts to show those plants that most resemble each other in leaf and twig characteristics. Often these are related plants; frequently, however, they are not. Wherever possible, related species are shown on plates as close to one another in sequence as is otherwise consistent with the main objective of grouping plants similar in appearance. Family relationships are indicated briefly in Appendix E. Because of great variation in leaf size no attempt has been made, except in a general way, to draw the plants to scale. Leaf and plant sizes are given in the text.


Side
Buds
End Bud
False
True
Bud Scale
Bundle Scar
Leaf Scar
Pith
Bud Scales: None
Two
Several
Bundle Scars: One
Three
Numerous
Pith: Solid
Chambered
Hollow
Stipule
Scar
Lenticel
Stipule
Scar
Buds: Opposite
Whorled
Alternate
Leaf Scars: Opposite
Whorled
Alternate
Stipule Scars: Not Ringed
Absent
Ringed

TWIG AND BUD TERMINOLOGY

SYMBOLS

For convenience in quick reference the following symbols are employed on the legend pages opposite the plates:

- ↟ **Tree.** A large woody plant having one (rarely several) self-supporting stems or trunks and numerous branches, the whole ranging from about 20 feet to a considerable height.
- Ѱ **Shrub.** Most plants in this *Field Guide* fall into this category. A shrub, or bush, is a woody plant, smaller than a tree, which consists of a number of small stems from the ground or small branches from near the ground.
- ↟Ѱ **Small tree or shrub** (usually not exceeding 25 feet). These borderline plants may assume either form.
- ʃ **Vine.** A climbing or sprawling woody plant without self-supporting upright stem.

SPECIES DESCRIPTIONS

Where both italic and boldface page references occur at the beginning of the species descriptions, the italic numbers refer to the silhouettes, the boldface numbers to the plates.

Plant names. Both common and scientific names are given for each species. Although for many species common names are well established, these or similar names are sometimes also applied to different, even unrelated species. For instance, Purple Honeysuckle frequently is given as the common name of an azalea. Other species may have no well-known common name. For the most part, one of the names given by Fernald (see my Preface) — usually the one considered to be most widely used — has been chosen for use in this book. But for tree species reference was made to the U.S. Forest Service *Check List of Native and Naturalized Trees of the United States* by Elbert L. Little, Jr. (Washington, D.C.: Govt. Printing Office, 1953). An effort was made to use the preferred common name given there; in some cases, where confusion seemed likely, alternates were chosen. The work of Kelsey and Dayton[*] was consulted on occasion. For some species, especially shrubs, in cases where no common names were known, or where it seemed preferable to avoid undesirable connotations, liberties were taken in modifying or assigning names. It is hoped that the names selected will be acceptable.

Scientific names have three essential parts: the name of the *genus* (plural, *genera*), the name of the *species* (plural, *species*), and the name or names, commonly abbreviated, of the botanist(s) who assigned the scientific names. Example: *Quercus rubra* L., where the initial stands for Linnaeus, the "father of systematic botany." Where the varieties (or, less frequently, forms) of species are named, the varietal name and the name or names of the authority or authorities responsible for them is placed after the scientific name of the species. Example: *Quercus rubra* var. *borealis* (Michx. f.) Farw.

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[*] *Standardized Plant Names,* 2nd ed., by Harlan P. Kelsey and William A. Dayton (Harrisburg, Pa.: McFarland, 1942) for the American Joint Committee on Horticultural Nomenclature.

A main purpose of scientific nomenclature is standardization, permitting botanists anywhere to discuss a plant with the assurance that they are indeed all talking about the same species. It is an international cataloguing system that also indicates, within limits, plant relationships. Scientific names are not constant, however, but may change as authorities decide that a species has closer relationships in a different genus than that first assigned, that what once were considered two species should only be termed two varieties of a single species, that a species described as new already had a name. The rules of botanical nomenclature are much too involved to go into here. To the reader the principal value of scientific names probably will be in looking up the same species in several reference books. As stated previously, the names used here are the same as those in the 8th edition of *Gray's Manual of Botany* (see my Preface). Following the example of Little (1953), however, none of the Latin species names are capitalized.

Incidentally, no one need hesitate to attempt pronunciations of scientific names. In the United States and Canada nowadays such names tend to be anglicized and most pronunciations are acceptable. If one can say *Hibiscus* or *Hydrangea,* he already uses scientific names. In speech, the authors' names are usually omitted.

Recognition. Plant descriptions are limited largely to identification characteristics. A statement of the general growth habits of the species is followed by characteristics of foliage, twigs, and bark. Invariably there is variation between individual specimens of a species. Where such individual variation may cause confusion in identification, its extent is indicated in the text. Attempts to describe degrees of "hairiness" are made where possible, but the exact extent of hairiness in leaves and twigs is sometimes difficult to describe. Nearly all leaves will show some fine hairs if examined closely under a hand lens. Plants described in the text or on the plates as being hairy are usually markedly so. "Hairless" plants are those in which hairiness is not conspicuous. A hand lens should be used in ascertaining the abundance of hairlike structures. Reference to bark is to the mature bark of large stems unless otherwise indicated.

The few measurements given are in the following order: leaf lengths, plant heights, and, for trees, trunk diameters. Minimum and maximum leaf lengths are generalizations for normal leaves and include the length of the leafstalk unless stated otherwise. Sprouts of some species bear abnormally huge leaves. The heights of shrubs are given as the usual maximums. For trees, the common minimum height and diameter for mature specimens are each followed by the common maximum for each measurement and, in parentheses, the exceptional maximum. Diameters are given for tree species and are trunk diameters at breast height (about 4½ feet above the ground; the foresters' d.b.h.). All these figures are given only as general guides. The several maximum measurements usually are not all possessed by a single specimen. The "largest" Jack Pine recorded by the American Forestry Association, for example, is only 27 feet tall, though 42 inches in circumference. All measurements are given in feet ('), inches ("), and fractions rather than in metric-system units, because the English units are more widely familiar in our area.

Flower and fruit data are limited to those general identification characteristics that might be useful in supplementing vegetative characteristics. Further details are provided only for those species not easily recognized by leaf and twig characteristics alone. Types of fruit cluster, though not given, are the same as for the flowers. The extreme dates of flowering and fruiting given may have to be modified by a month or so, according to locality. Where fruiting dates are lacking, those of the flowers will indicate at least the earliest possible for fruits. Fruit colors apply to ripe fruits.

General statements regarding the distinctiveness of certain species apply to the geographic area of the book.

Similar species. Critical differences are discussed for species that most closely resemble one another, either when in foliage or in leafless condition.

Where found. General habitat and limits of distribution are given for the area north of Mexico, range limits reading from northeast to northwest and southeast to southwest. These are taken mainly from Fernald (1950); Little (1953) scarcely differs. For illustrated plants geographic ranges are opposite the plates and for nonillustrated or partially illustrated, in the text; sometimes, however, the range is duplicated on the legend page to aid identification of certain species.

Remarks. General observations are provided on those plants that serve as sources of lumber, fuel, medicine, food, drink, poison, fiber, ornament, tannin, and Christmas trees, or are of especial value in soil and wildlife management. References to wildlife usually are limited to game birds and to mammals of chipmunk size or larger. Most of such references are taken from William R. Van Dersal's *Native Woody Plants of the United States: Their Erosion Control and Wildlife Values* (U.S. Dept. of Agriculture Misc. Publ. 303, 1938).

IDENTIFYING UNKNOWN PLANTS

Before attempting to identify unknown plants, one should first learn the general appearance of Poison-ivy, Poison-oak, and

Poison Sumac (Plates 25 and 26). Once their main characteristics are learned, the plants are easily avoided.

Rather than collecting specimens for later identification at home, it is highly preferable that identifications be made in the field, where additional materials are available and growth habits are evident. If this cannot be done, then twig specimens, with leaves when available, may be collected and either carried fresh or pressed. *Good specimens are essential to easy identification.* Dwarfed, twisted, gnarled twigs should be avoided. Except for abnormally large sucker shoots, strong quick-growing twigs should be collected for study. On such twigs, the leaves and leaf scars are larger and all details are more evident.

In summer, the first step in identifying an unknown plant is to place it in one of the five main groups (see drawings, pp. xvi–xvii) according to leaf type and arrangement:

1. Leaves needlelike or scalelike — Section I, p. 15
1. Leaves broad:
    2. Leaves opposite or whorled:
        3. Leaves compound — Section II, p. 46
        3. Leaves simple — Section III, p. 66
    2. Leaves alternate:
        4. Leaves compound — Section IV, p. 122
        4. Leaves simple — Section V, p. 168

Turning to the proper Section, one follows the key given there.

Keys to plant identification may look formidable at first but should be regarded as something like a book's table of contents. They merely divide the subject matter, in this case plant species, into subsections, further sub-subsections, and eventually species or groups of species. For the most part keys attempt to divide the many species into two groups. Then each group in turn is divided into two. This is repeated again and again until finally species or groups of species are named. In such a key, as in the short one of the preceding paragraph, the person seeking identification of a tree or shrub chooses first between the two number 1's, then between the two number 2's, and in that case finally decides between either of the two number 3's or the two number 4's. It is only a matter of following a trail that forks repeatedly but rarely offers more than two paths at any single point. The seeker continues to make choices between the options which bear the same number, making certain at each point that the choice made fits the plant being identified, until an end point is reached.

After following the sectional key, the plate (or plates) finally arrived at are then scanned and the species most like the unknown one is selected. It is important to take the next step and *read the text description* of the species. Agreement should be reached between the specimen and its description and range, or else another attempt should be made to "run it down." The text portion on "Similar species" also may disclose errors in interpreting identification marks.

It is possible, of course, to disregard the sectional leaf keys and rely upon spotting the proper diagram, for the plates in themselves are a pictorial key. This often is possible if the species falls in Sections I through IV. There are relatively few plants with needlelike, compound, or opposite leaves. But unless the specimen has quite distinctive characteristics, in Section V one should follow the keys.

In winter, unless the plant is evergreen, one must either find leaf remains on or under the specimen (and run some risk of picking up a wrong one) or rely on twig and other winter characteristics. If dried leaves are found, one can attempt to proceed as in summer. If not, then it is suggested that good twig specimens be secured and the Winter Keys used as follows:

Leaf scars opposite or whorled — Appendix A
Leaf scars alternate — Appendix B.

The most difficult time for woody plant identification usually is early spring, when buds have burst but leaves are small and new twigs soft. Some plants then may not be easily identifiable for a month or so.

Where one wishes to identify a plant that is definitely a tree (plants smaller than 25 feet or so might be either shrubs or small trees), another approach is available through the keys to tree identification supplied as appendixes. Appendix C is for trees in summer leafy condition and Appendix D for use in winter. These two keys supplement the others given throughout the book and need not be used unless one wishes to.

Everyone likes to feel that he has discovered a rare specimen. But when one identifies a species outside its usual range or thinks he has something entirely new to science it would be well to recheck carefully to make certain that no error in identification has been made. If something unusual still seems likely, a specimen could be collected (with flowers or fruits, if possible, and always with notes on the exact location, date of collection, and collector's name and address), carefully pressed, dried, and forwarded to the department of botany at one's state or provincial university or agricultural college with a request for confirmation of identification.

EQUIPMENT

Fortunately, plant identification requires little paraphernalia. Only two items are essential: a field guide or manual and a hand lens. Some progress can be made without the latter, but a good hand lens is especially helpful in ascertaining twig characteristics.

Furthermore, it discloses hidden beauty in small tree blossoms and in other plant parts. Lenses for general use should magnify 6× to 10×. Those manufactured by well-known optical companies generally are worth the slightly higher price usually asked for them. Hand lenses sell for from $8 to $15 and are practically indestructible. Often secondhand ones can be procured very cheaply, especially in university towns.

It is strongly suggested that *identification be made in the field*, where additional specimens and supplementary data are available. When you need to collect specimens, however, a large plastic bag will preserve them until they can be pressed. A roll of newspapers held by a strap, or even a large magazine, may also do well as a field carrier if specimens are being carried for early identification, but serious collectors will want to acquire a plant press, available from any biological supply house.

In a press, plants are placed within newspaper pages, which are inserted between blotters and placed between sheets of corrugated cardboard. The entire series is packaged between wooden frames and securely tied by straps. It will occasionally be necessary to replace newspapers and blotters to permit thorough drying and to prevent molds from invading the collection.

PLANT SUCCESSION

Each plant species, through evolutionary processes, has become something of a specialist. Each lives in a certain type of place, the *habitat*, and each thrives under a particular set of climatic, soil, and water conditions. On a newly available site local conditions are varied and usually seeds or other reproductive parts of several species manage to be present. This results in the establishment of a *plant community* composed of several species. Once established, most plants and plant communities alter their sites so that the longer they persist in a spot the less suitable it becomes for them. Increasing fertility due to root decay and leaf fall, for example, may permit competition from species originally unable to become established on the site; or increasing shade may prevent survival of seedlings even though they are adjacent to or even surrounded by their parents. These factors and others result in the phenomenon of *succession*, wherein plant communities and the soils they occupy pass through succeeding stages until finally a stable community of plants and a mature soil structure are developed. This final relatively permanent community is the *climax* plant association.

Primary plant succession occurs when community development begins and develops from a bare surface or in open water. Primary succession may begin on such areas as cliff faces, rockslides, gravel slopes, road cuts, sand dunes, lava flows, peat deposits, gully sides, or on shallow lake bottoms, in bogs, or on river bars and deltas. In such places *pioneer* plant communities become established which eventually are succeeded by others, each of which tends to be more intermediate in its moisture requirements than the community it replaced. That is, within the limits set by climate, succeeding communities beginning in a wet environment live on drier sites than do their predecessors, while those in a dry environment live on moister sites, with the climax community occurring on neither wet nor dry, but upon intermediate, moist sites.

Secondary plant succession occurs when a plant community is entirely or partly killed or removed, exposing a soil that has already advanced to some degree toward maturity. Such plant destruction might be accomplished by light fires, trampling, drainage, windthrow, lumbering, cultivation, or otherwise. The secondary plant community series that follows a change in the original vegetation is generally different from that of the primary succession.

Species in developmental stages of plant succession may be more widespread than those of the climax stage. They may even take a part in succession in regions with different climax types. Some species may occupy slightly different habitats and successional stages in different portions of their ranges, whereas others are restricted to only a portion of a single climax area.

Knowledge of local successional stages is very important in studies of land use, soil conservation, forestry, wildlife management, and outdoor recreation. An interesting and valuable project for the amateur botanist is the preparation of a plant succession chart for his locality (see H. J. Oosting's *The Study of Plant Communities*, San Francisco, Freeman and Co., 1956).

CLIMAX VEGETATION TYPES

From north to south and from east to west in our area, major changes in the character of the climax vegetation are evident. These major units are mostly characterized by distinctive vegetative *life forms* (evergreen trees, deciduous trees, grasses, etc.) and are termed *plant formations.* The *tundra* of the Far North and of the mountaintops of eastern Canada and New England is vegetated with sedges, grasses, lichens, herbs, and low and creeping shrubs. The northern evergreen or *boreal forest* that covers most of Canada and part of the northern United States is dominated by White Spruce and Balsam Fir, although American Larch becomes prominent along its northern edge. The *hemlock-hardwood* forest of the Great Lakes area — a formation of mixed conifers and broad-leaved trees — sometimes is also designated as the *lake forest.* Its dominant species include Hemlock, Beech, Sugar Maple, Yellow Birch, and White Pine.

Over most of our area is the broad-leaved or *deciduous forest.* Several principal climax associations occur in this formation: (1) Mixed Mesophytic (Beech–Sugar Maple–Tulip-tree–Sweet Buckeye–White Oak–Red Oak–Hemlock) in southern mountain valleys and some lowlands, (2) Beech–Sugar Maple in moist deep soils, (3) Oak–Hickory or Oak–Pine (and formerly Oak–Chestnut) mostly in drier areas, and (4) Sugar Maple–Basswood in parts of Wisconsin and Minnesota. On the flat coastal plain in the southeast of our area is a portion of the *southeastern evergreen forest,* principally of Loblolly and Shortleaf Pines. *Prairie* formations occur in the western part of our area, with woody species important only in valley bottoms.

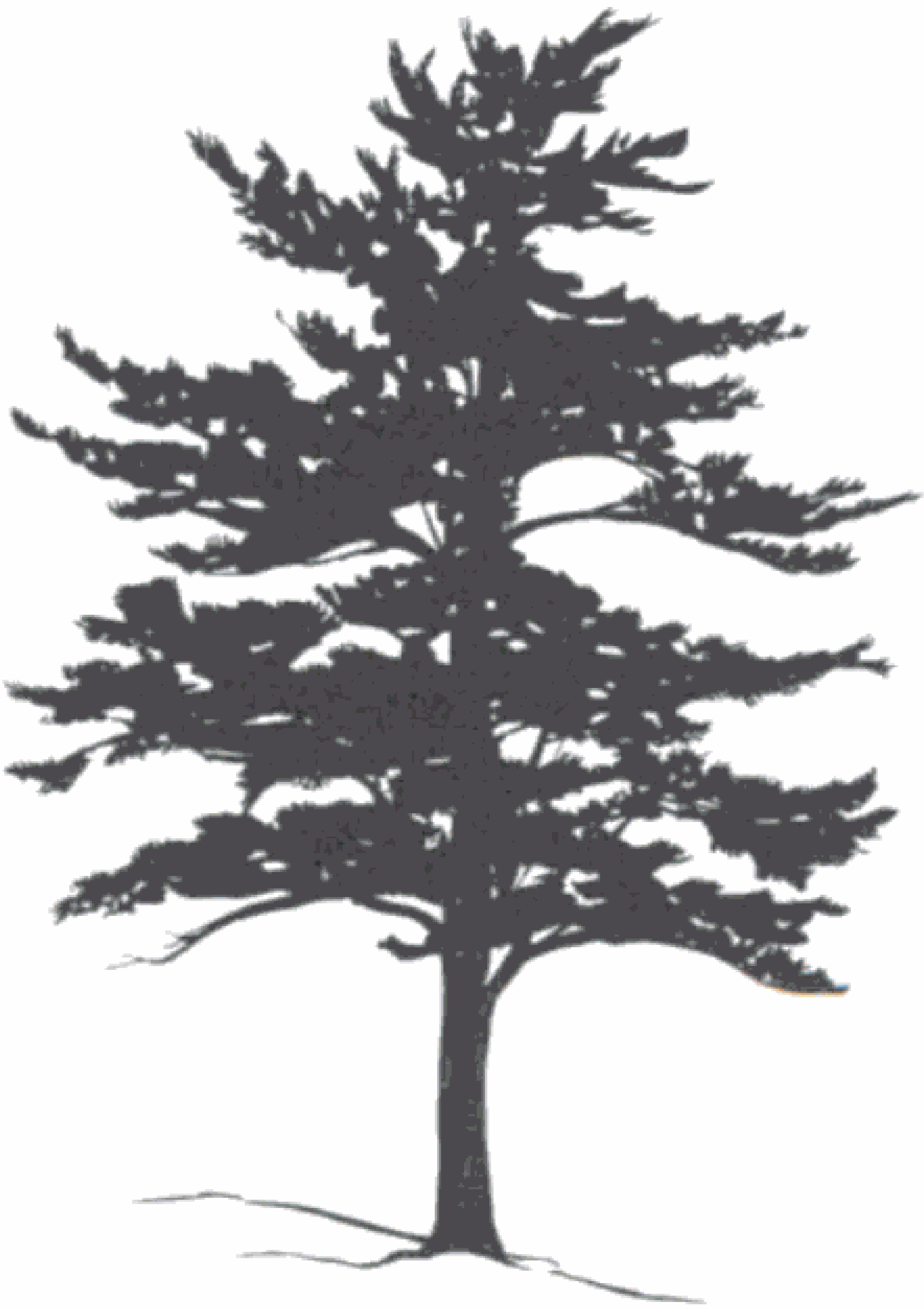
A Field Guide
to Trees and Shrubs

Tree Silhouettes

(*by R.T.P.*)

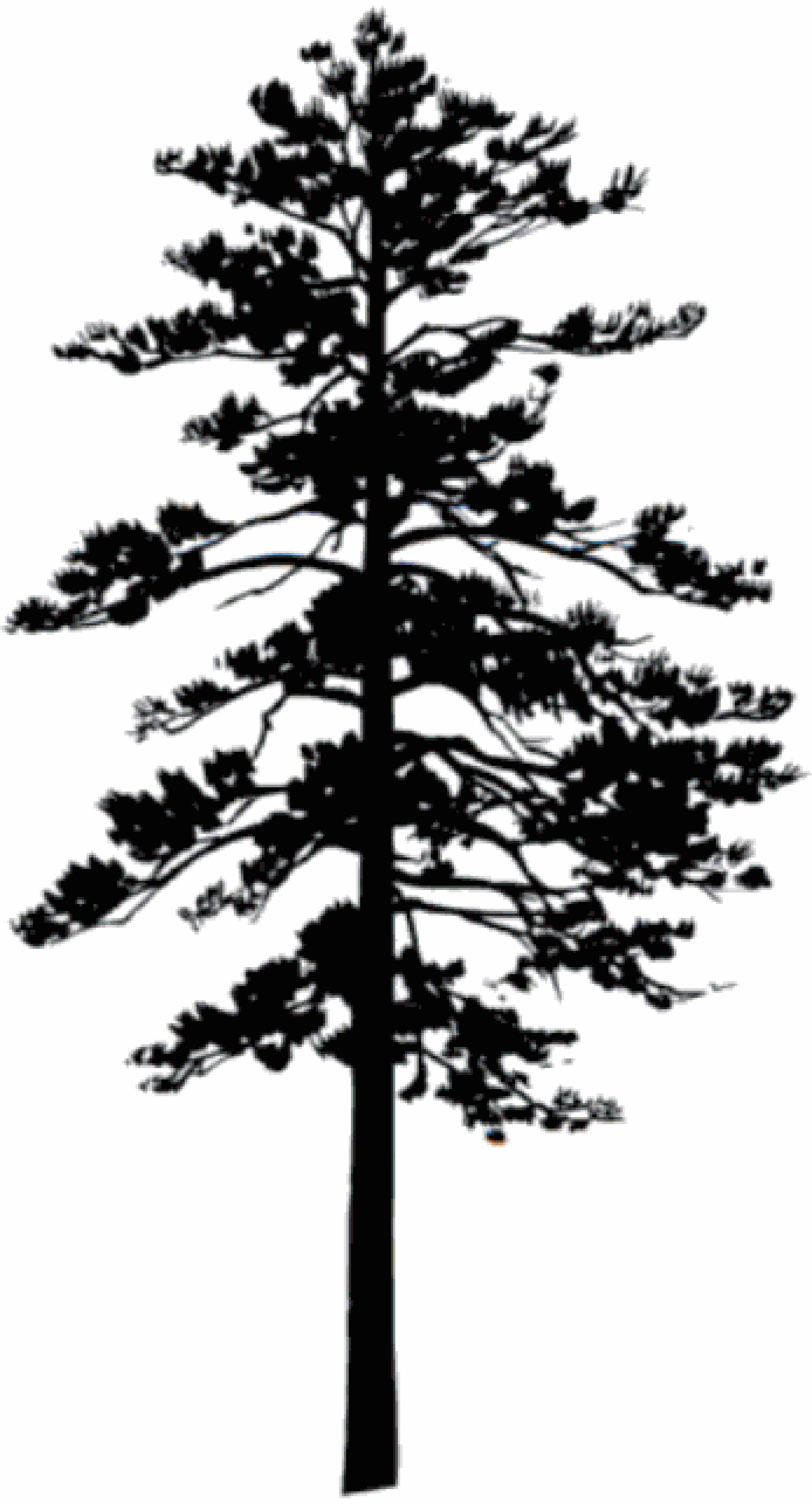
An expert bird-watcher can often identify a bird by its silhouette alone. Birds are dependable: a grackle always is shaped precisely like a grackle, and one starling invariably resembles another starling. Trees, on the other hand, are not so consistent. The beginner, learning his trees, yearns for a book that will give him shapes and field marks by which he can make snap identifications from a moving car. But it isn't that easy. True, an elm somehow always looks like an elm, but many trees assume a variety of shapes. A young tree might look entirely unlike a grizzled veteran of the same species. And a forest-grown tree, reaching for the light, might be tall, slender, and restricted in its branching compared to a field-grown example where plenty of sun, soil, and moisture have enabled it to develop a maximum crown.

But within limits one can, with a little practice, recognize by shape and manner of growth quite a few of the trees and also some of the shrubs. On the following pages are presented some silhouettes of a selection of trees (and one or two shrubs). Not all examples will look like these, but they are, on the whole, typical. They represent open-grown specimens, not those of crowded woodland situations. If in doubt check the leaf and twig characters. Silhouette page numbers appear in italic at the beginning of the descriptions in the text.



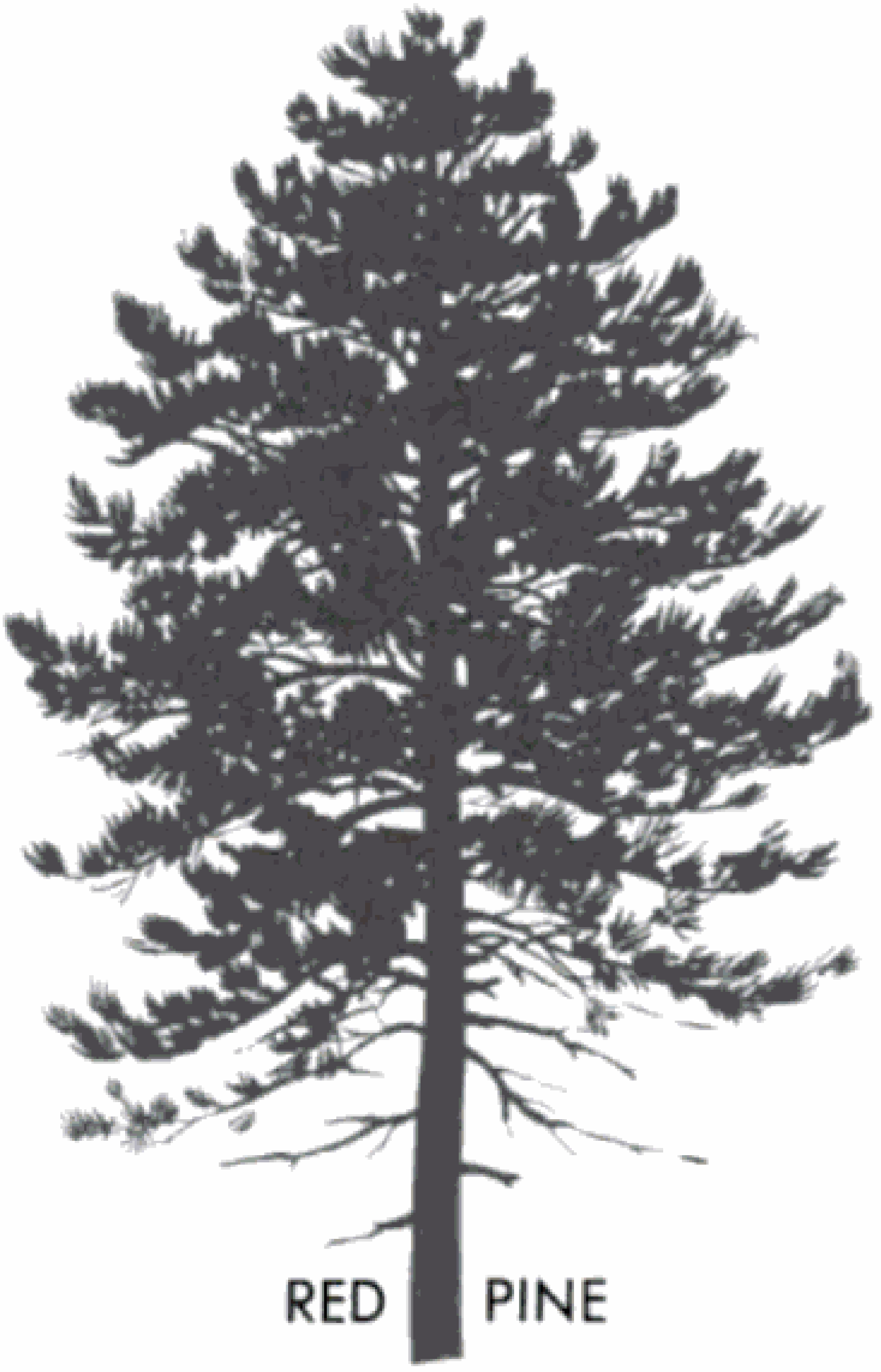
WHITE PINE

Tall dark trunk; spreading horizontal limbs; delicate spraylike foliage



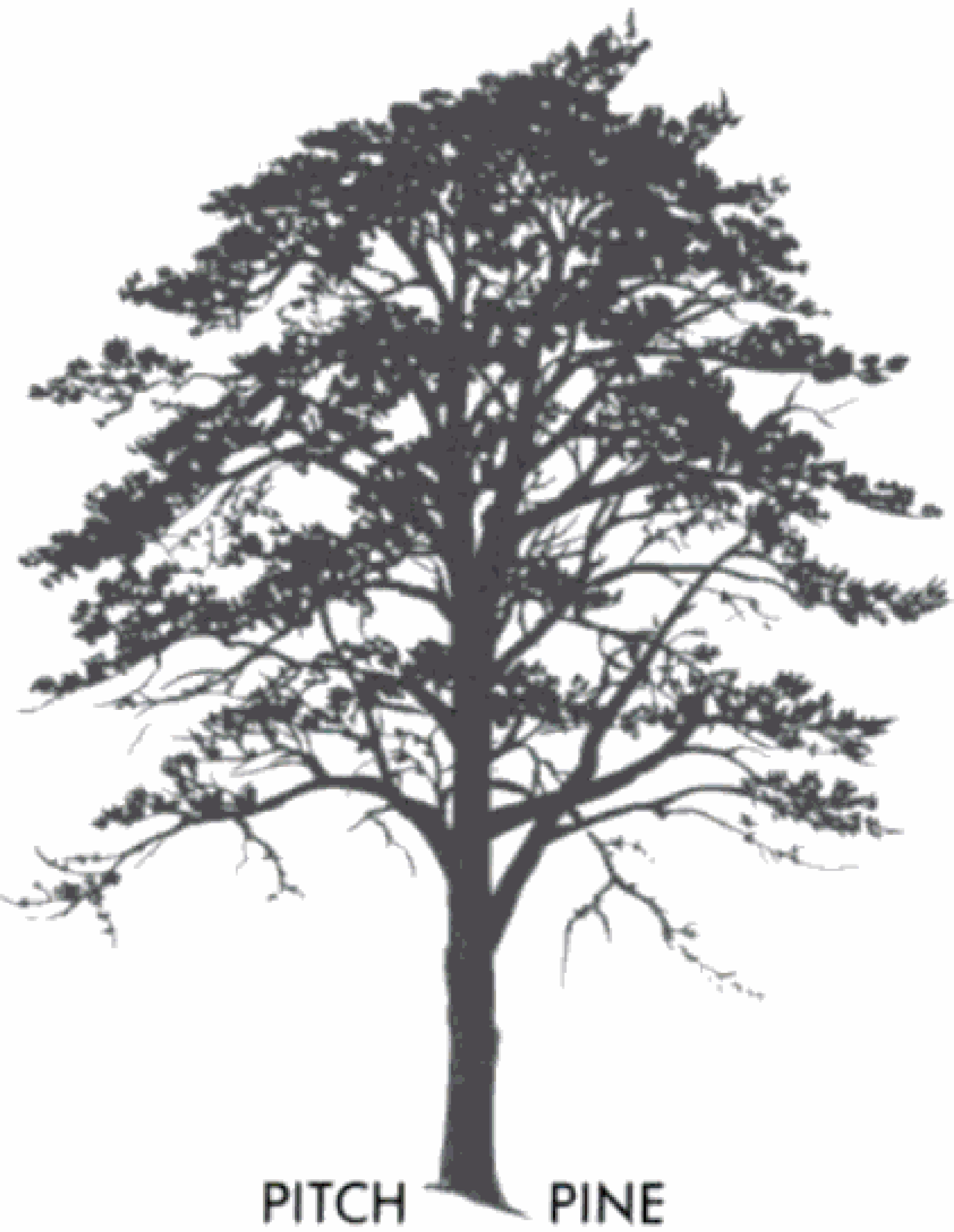
LOBLOLLY PINE

Tall, clean cinnamon trunk; open crown, drooping lower limbs



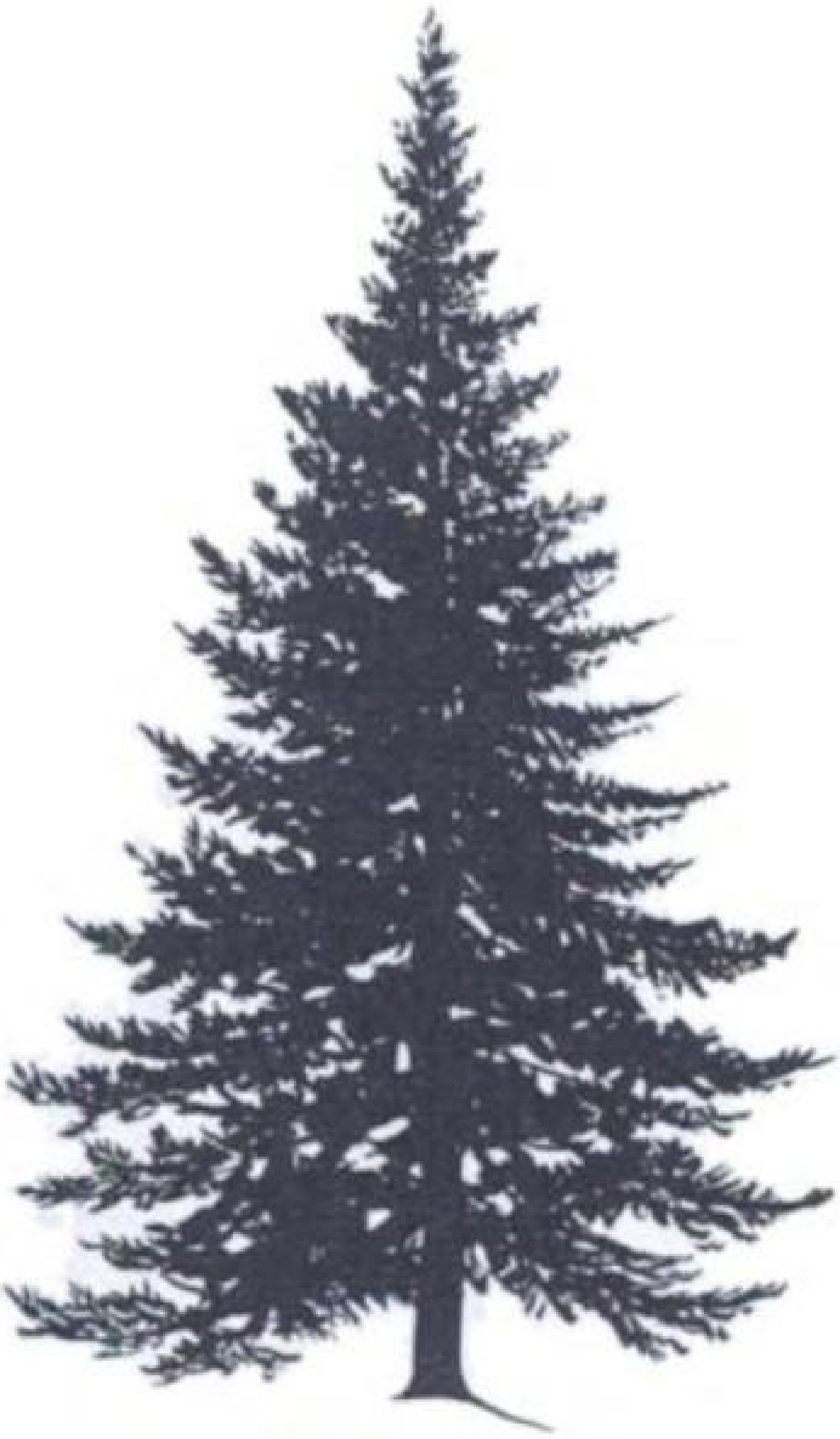
RED PINE

Tall, erect trunk; stout right-angle branches, symmetrical crown; long dark green foliage, ascending tips



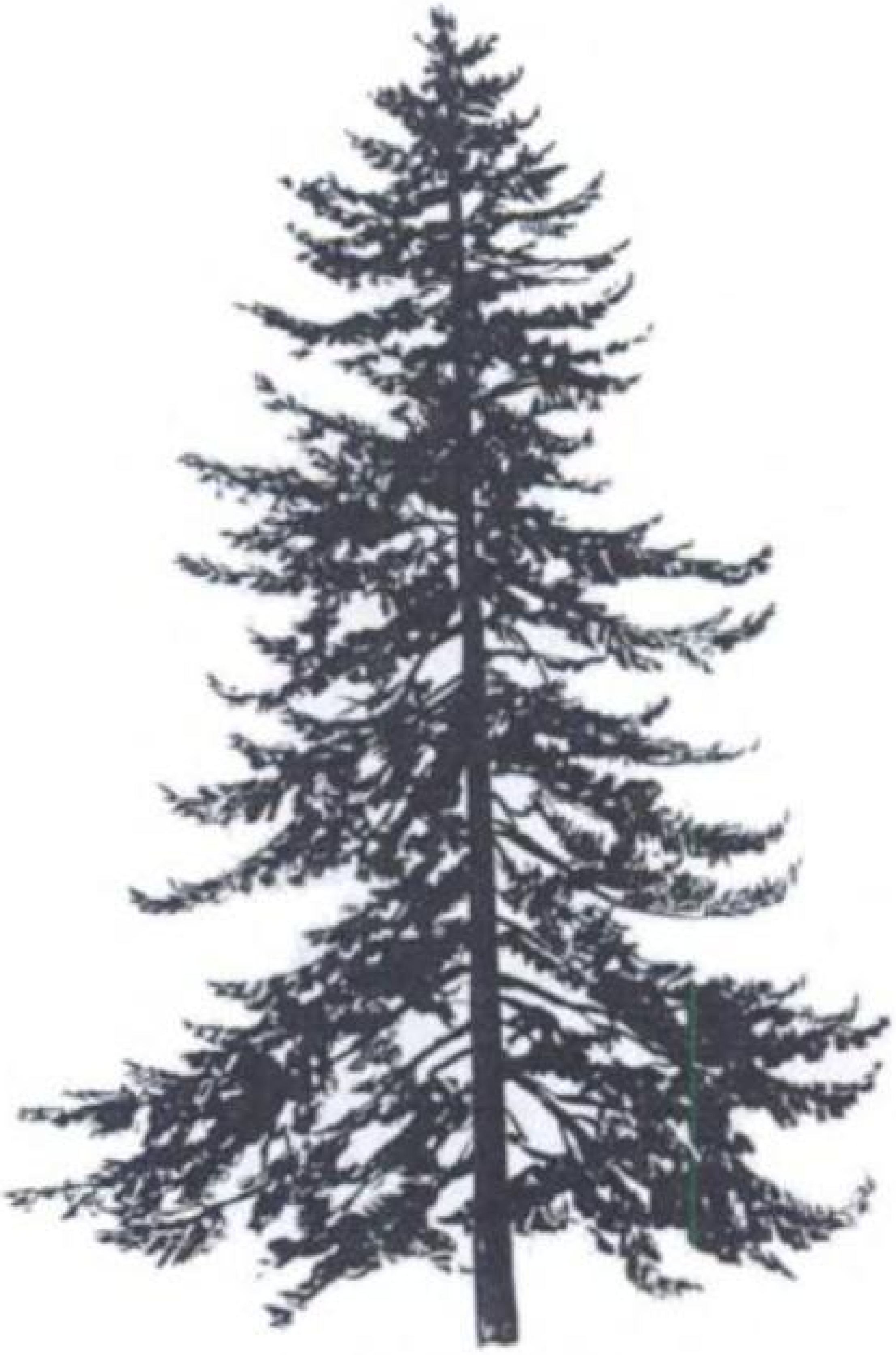
PITCH PINE

Usually low, irregular, scraggly; many dead branches; coarse foliage in rigid tufts



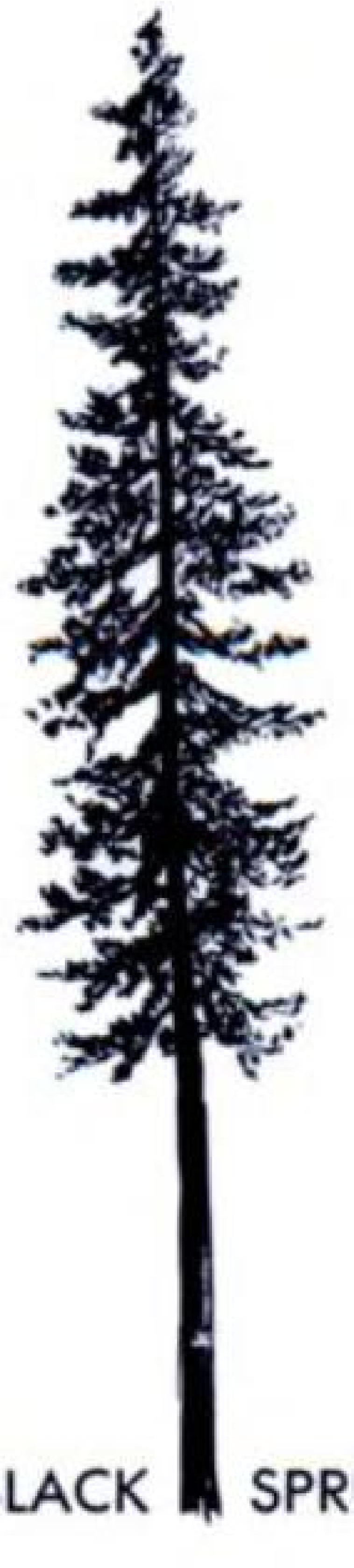
WHITE SPRUCE

Pyramidal; upper branches ascending, lower nearly horizontal; foliage bluish green



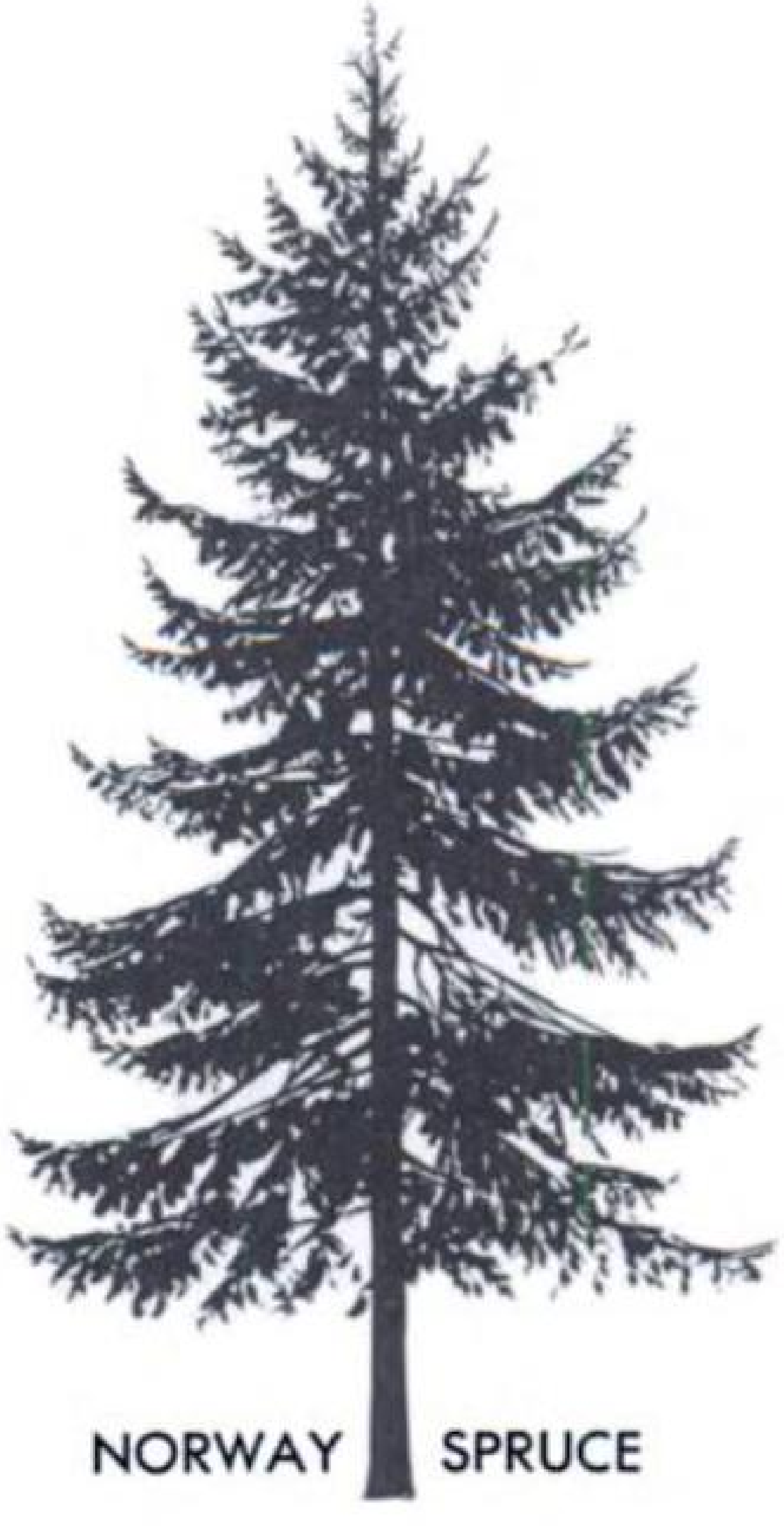
RED SPRUCE

Rather open-branched, tips upcurved; foliage yellowish green



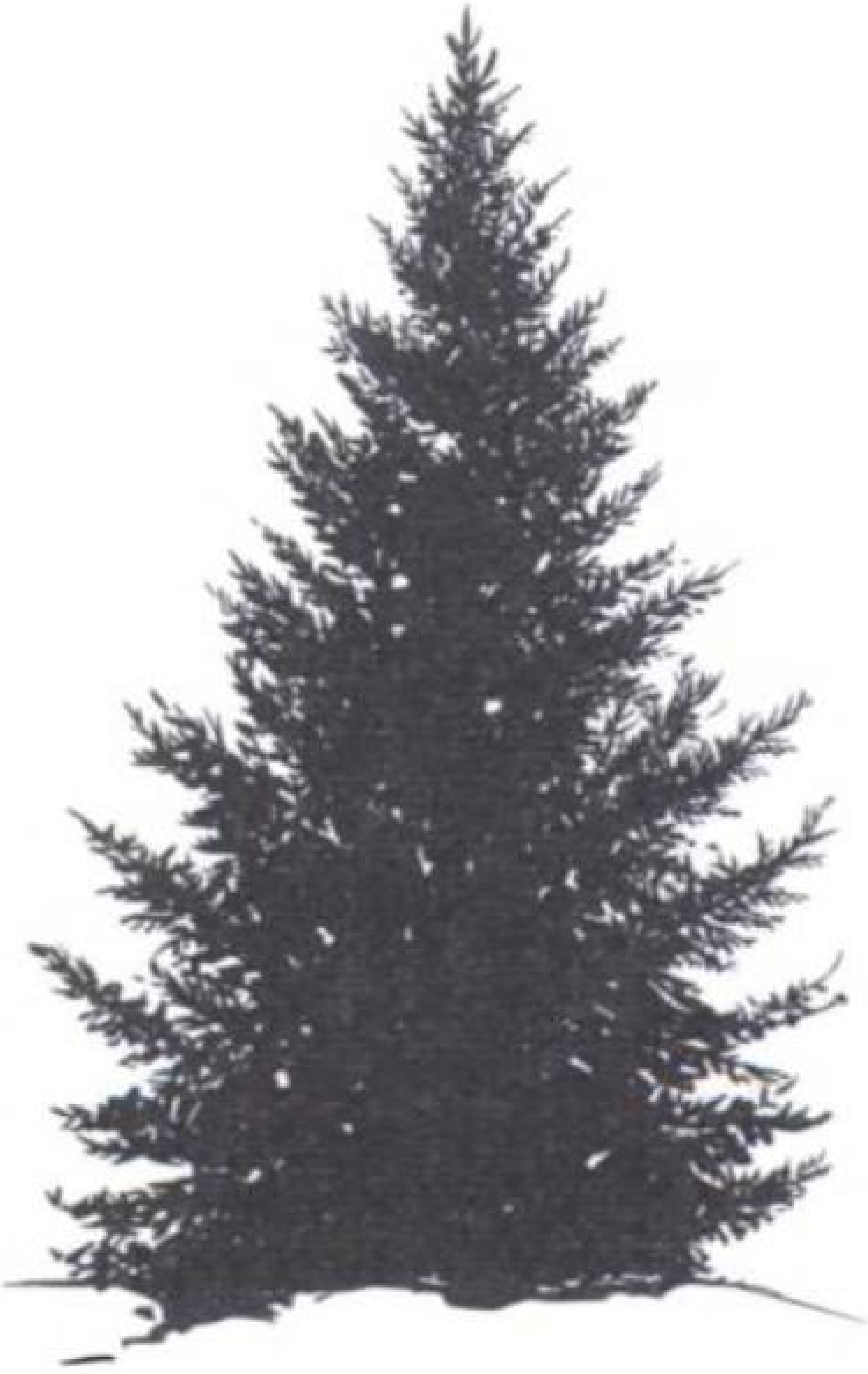
BLACK SPRUCE

Slender; short branches; foliage bluish green

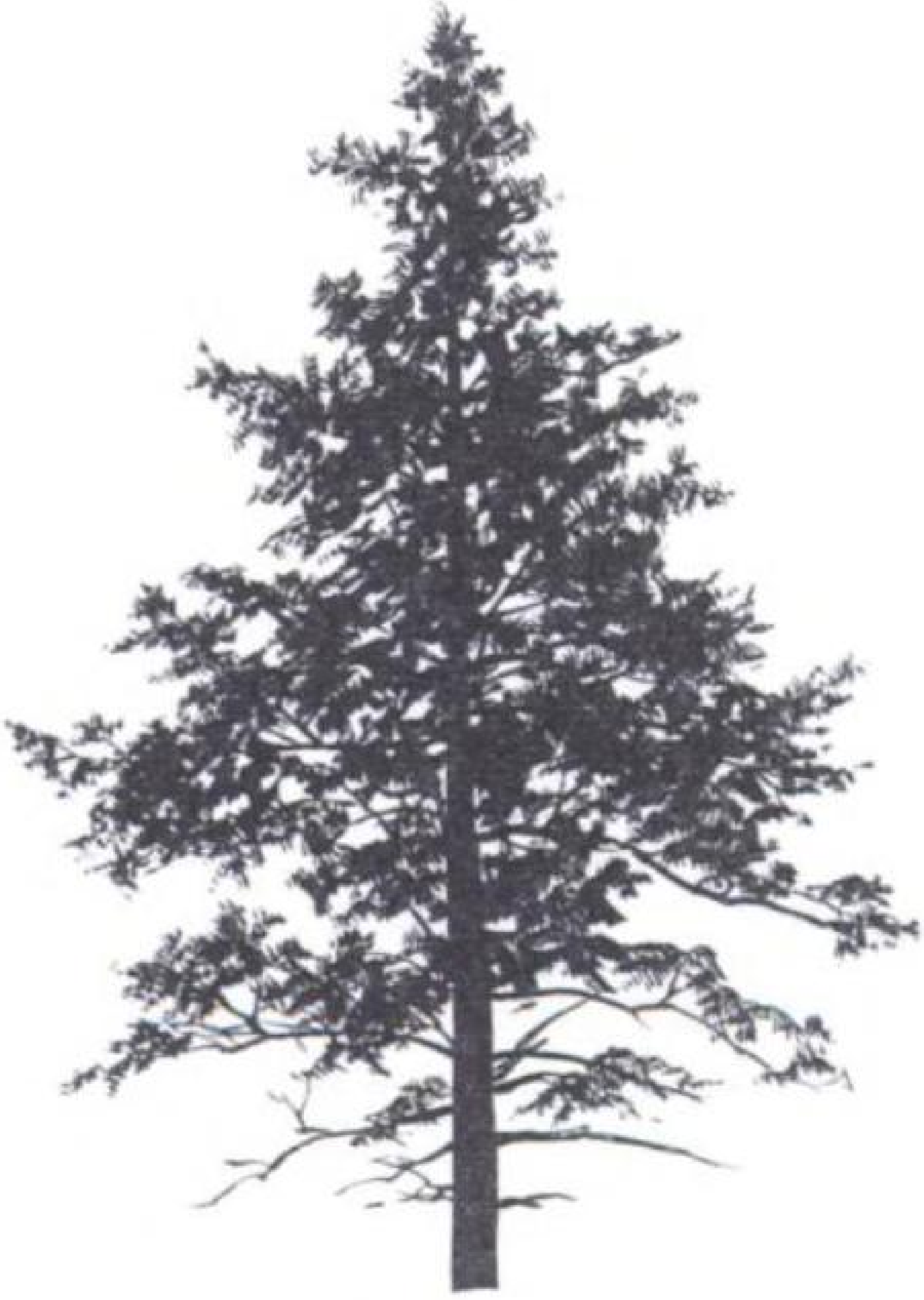


NORWAY SPRUCE

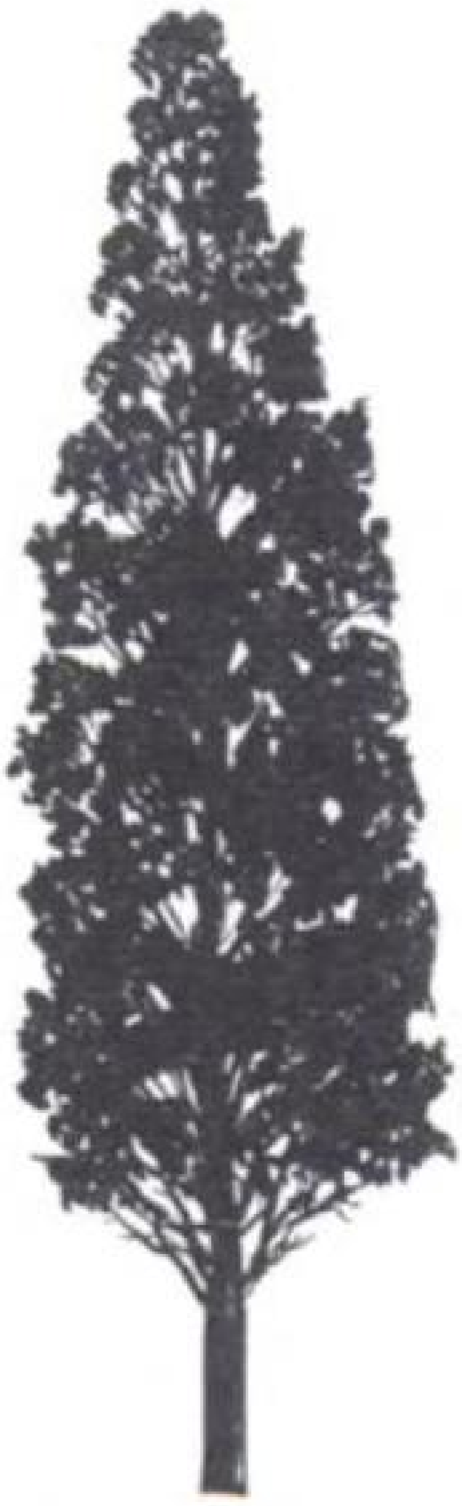
Usually near houses; pyramidal; strongly drooping lateral branchlets



BALSAM FIR
Conical; branches ascending; erect cones; flat needles

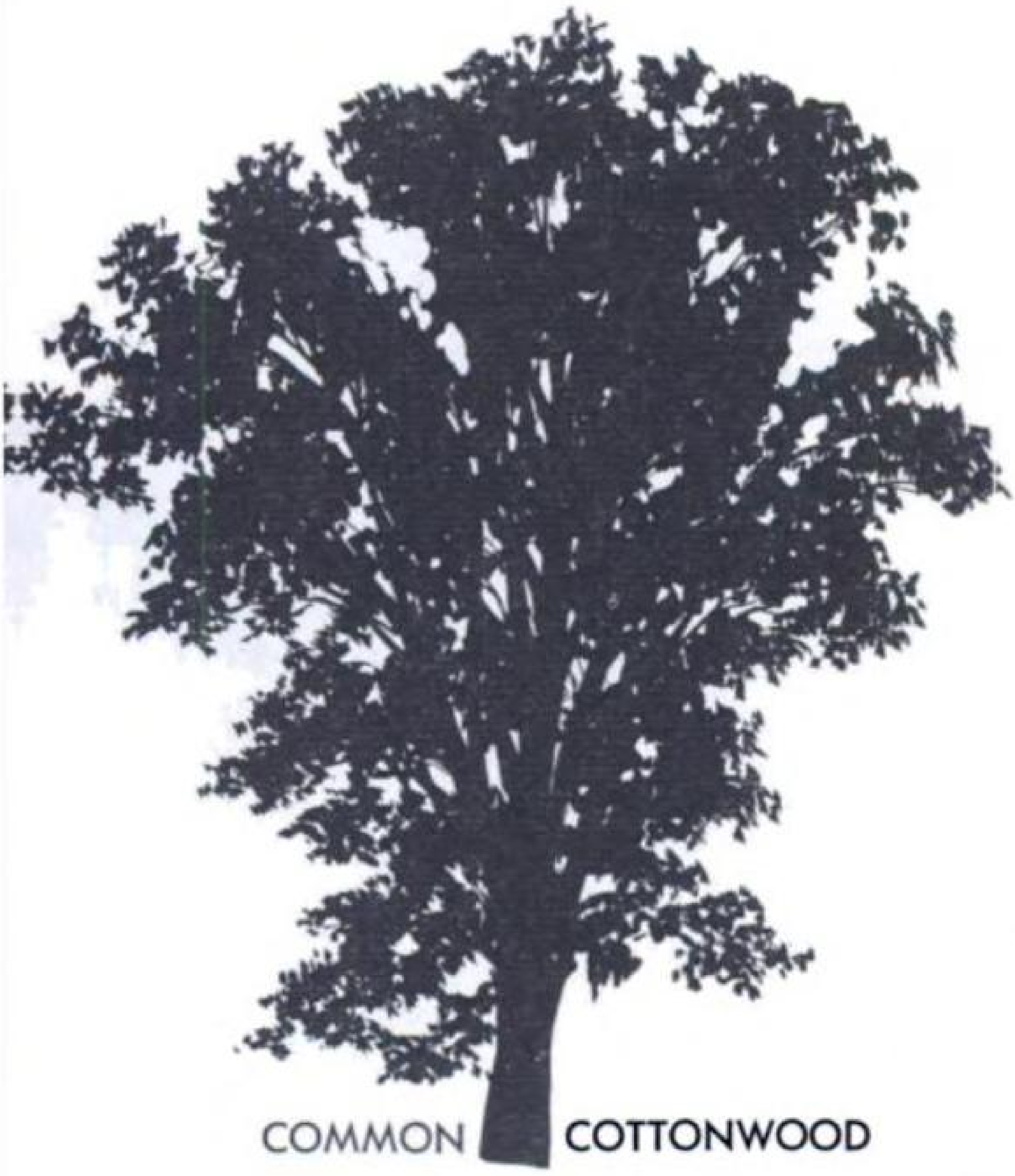


HEMLOCK
Loose, irregular, feathery; short flat needles



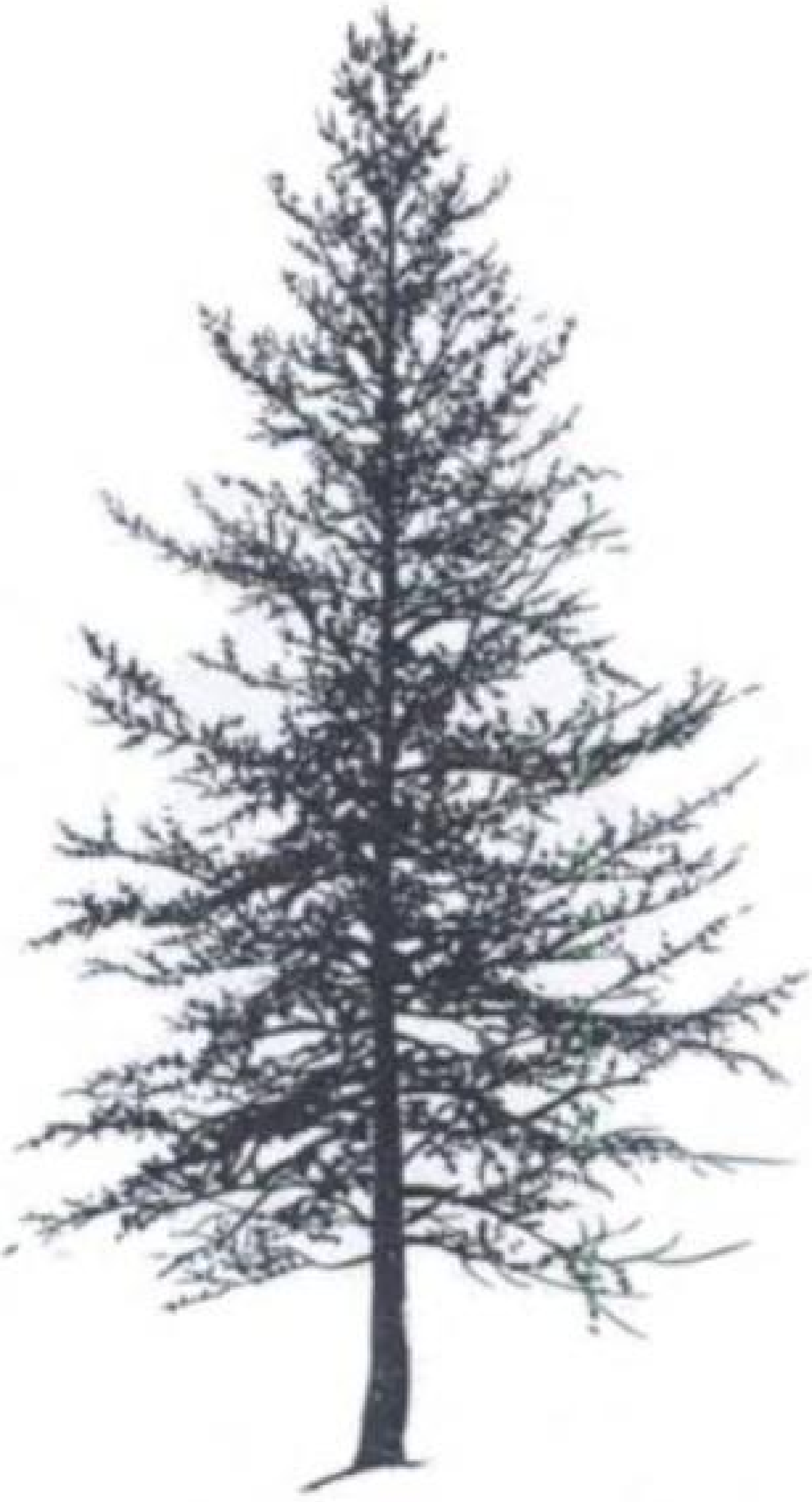
RED CEDAR
Conical head (wider with age); short stem

NORTHERN WHITE CEDAR
Dense conical head clothed almost to base; flat sprays



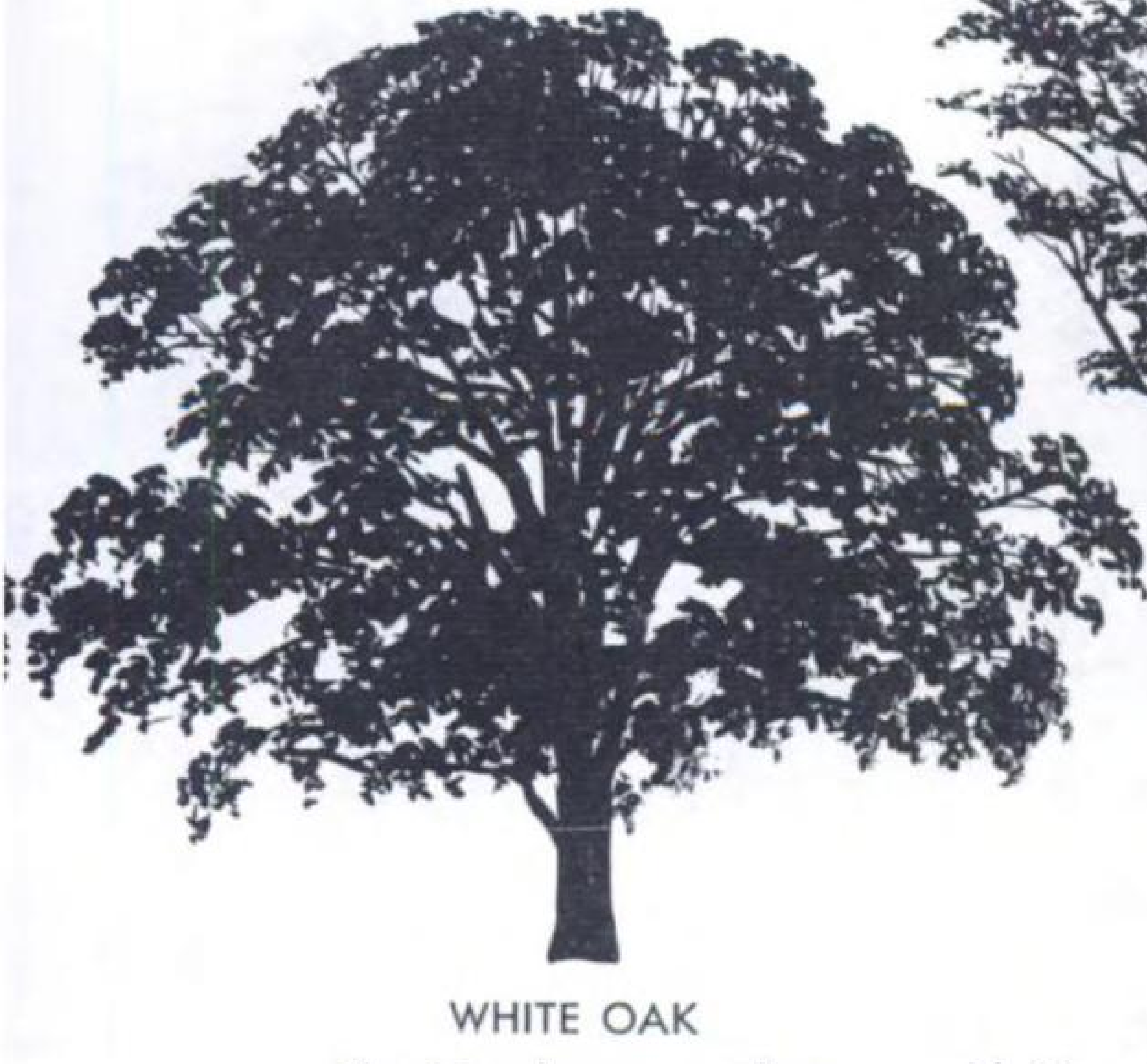
COMMON COTTONWOOD

Wide-spreading open crown (shaggier than Elm)



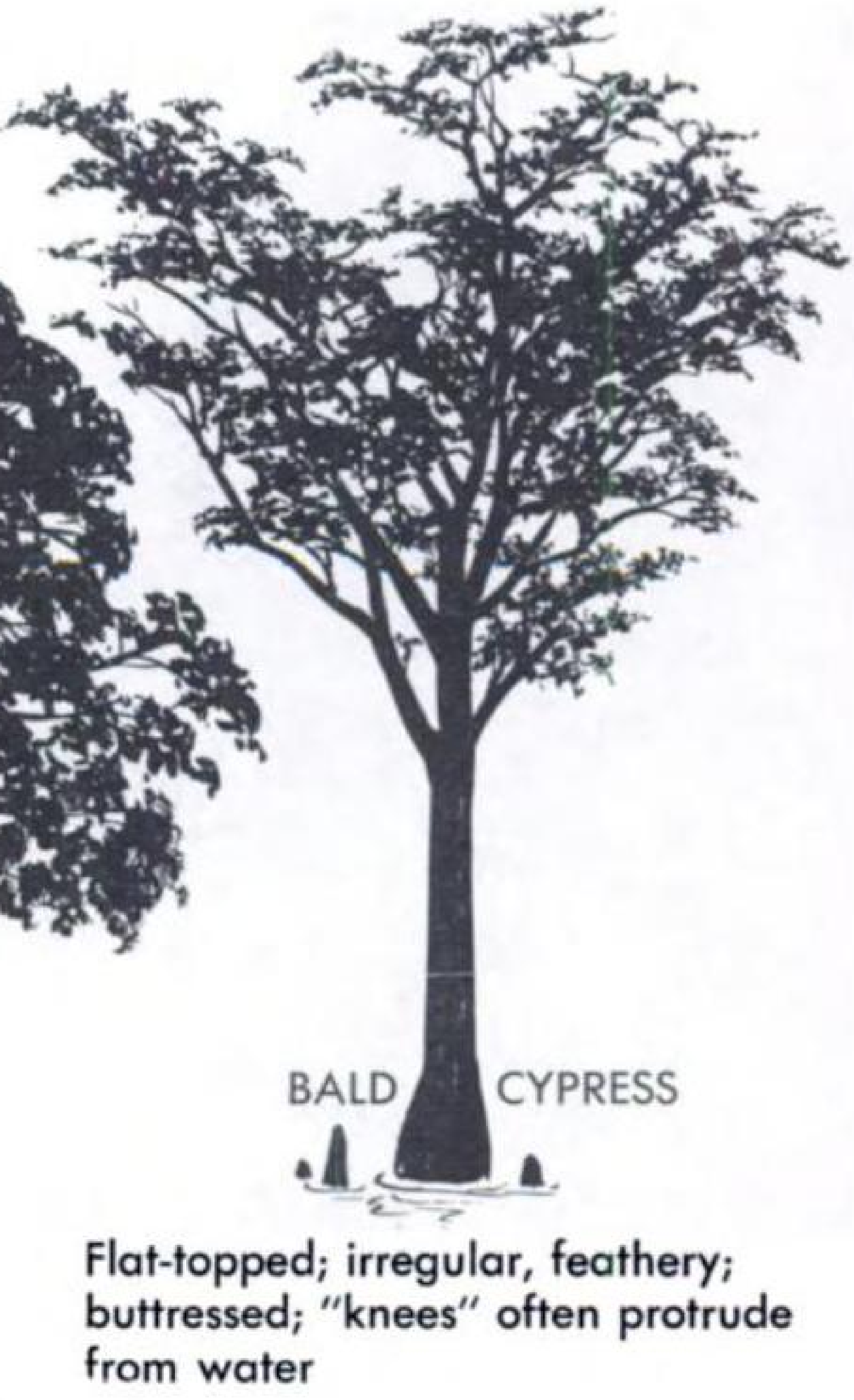
AMERICAN LARCH

Pyramidal (when young); short needles in tufts (shed in winter)



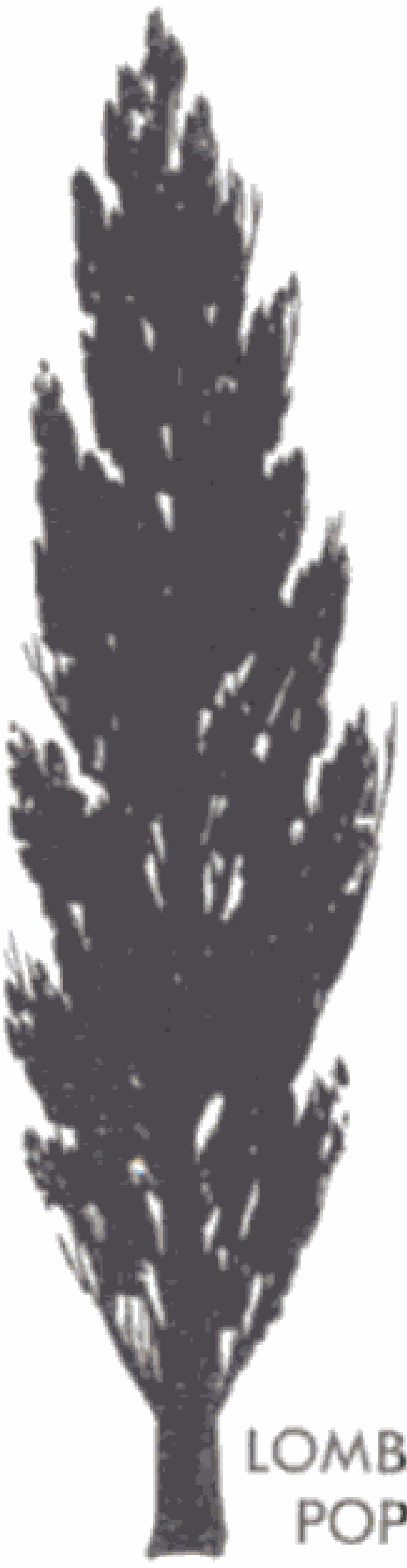
WHITE OAK

Short trunk; crown often much wider than high

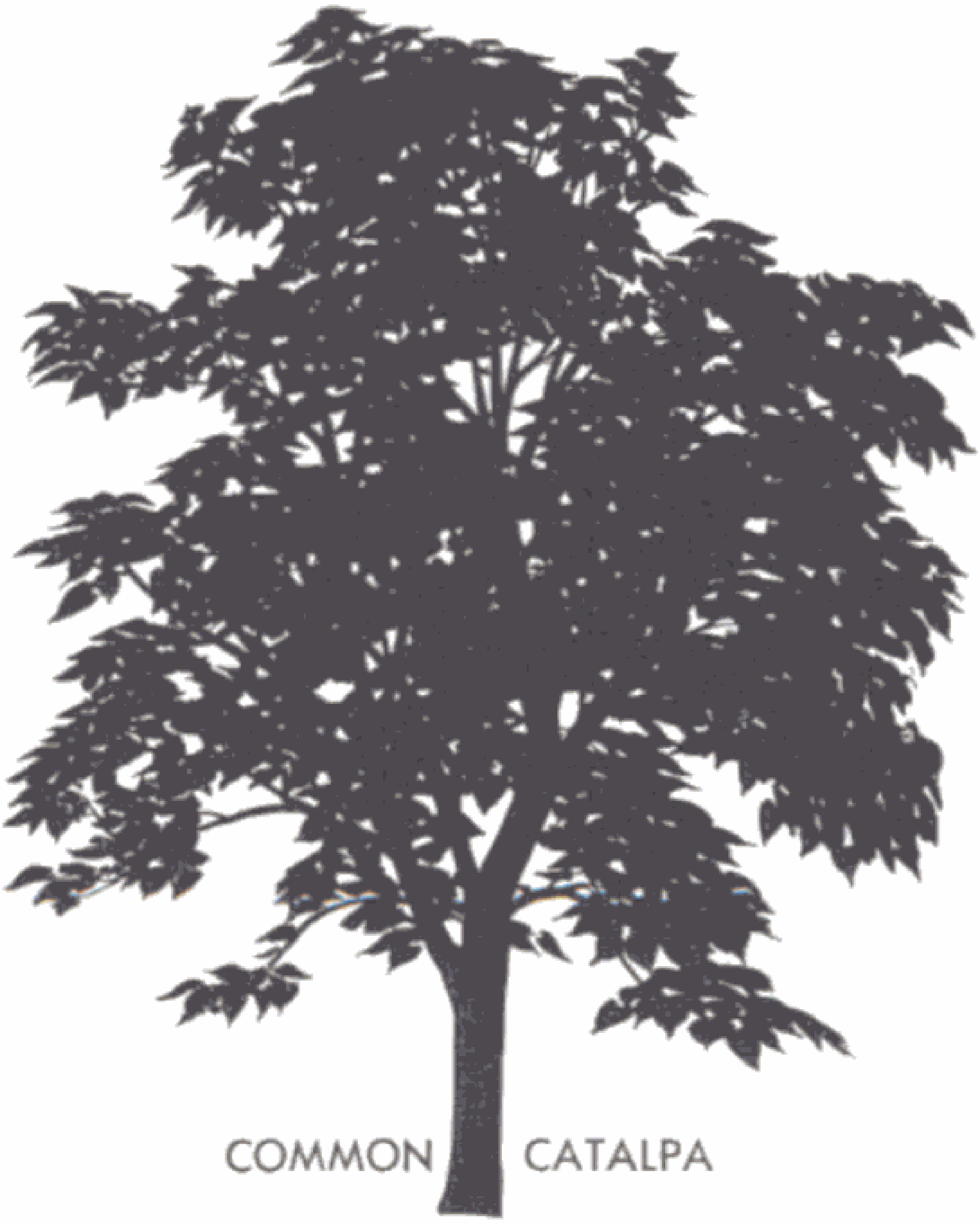


BALD CYPRESS

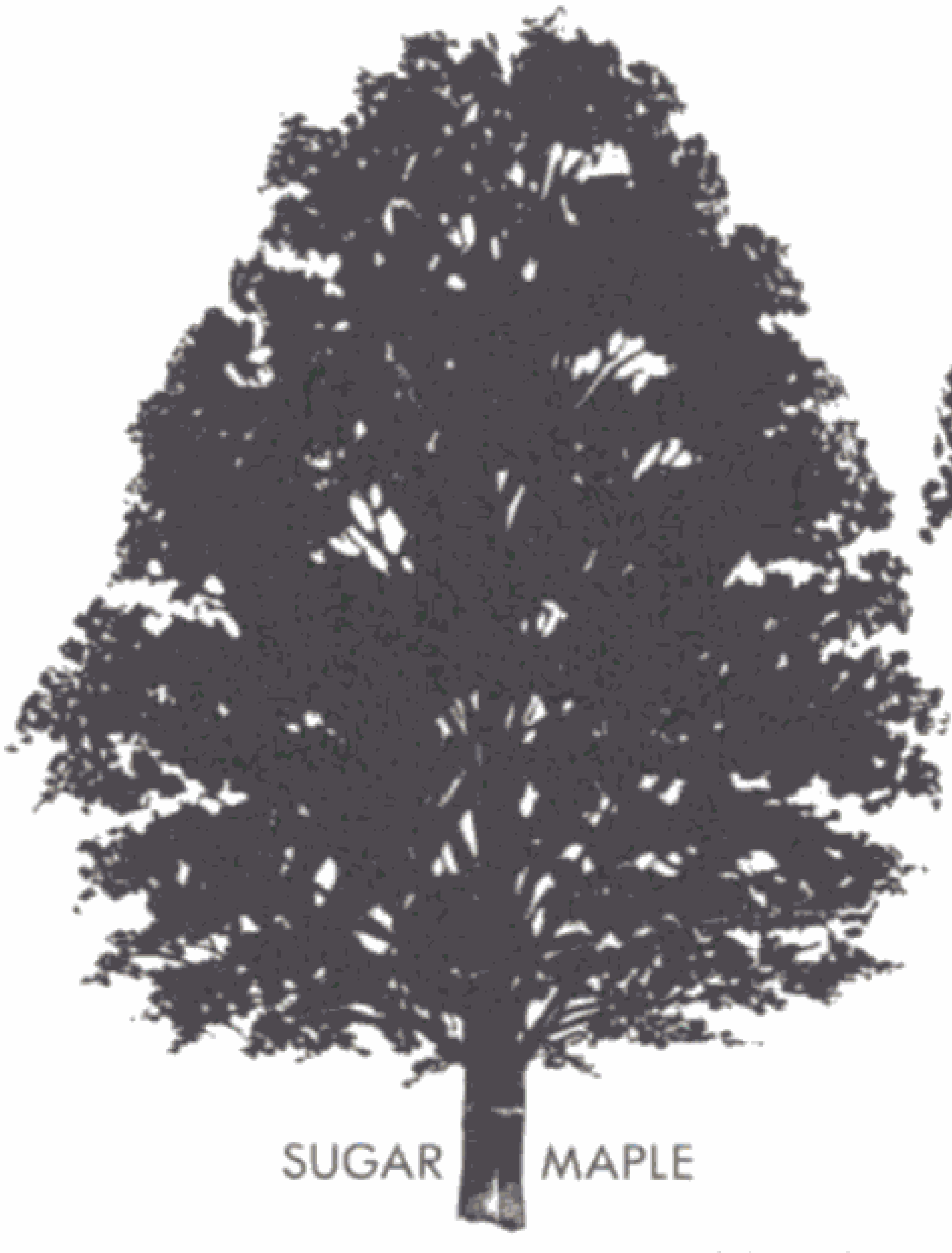
Flat-topped; irregular, feathery; buttressed; "knees" often protrude from water


LOMBARDY
POPLAR

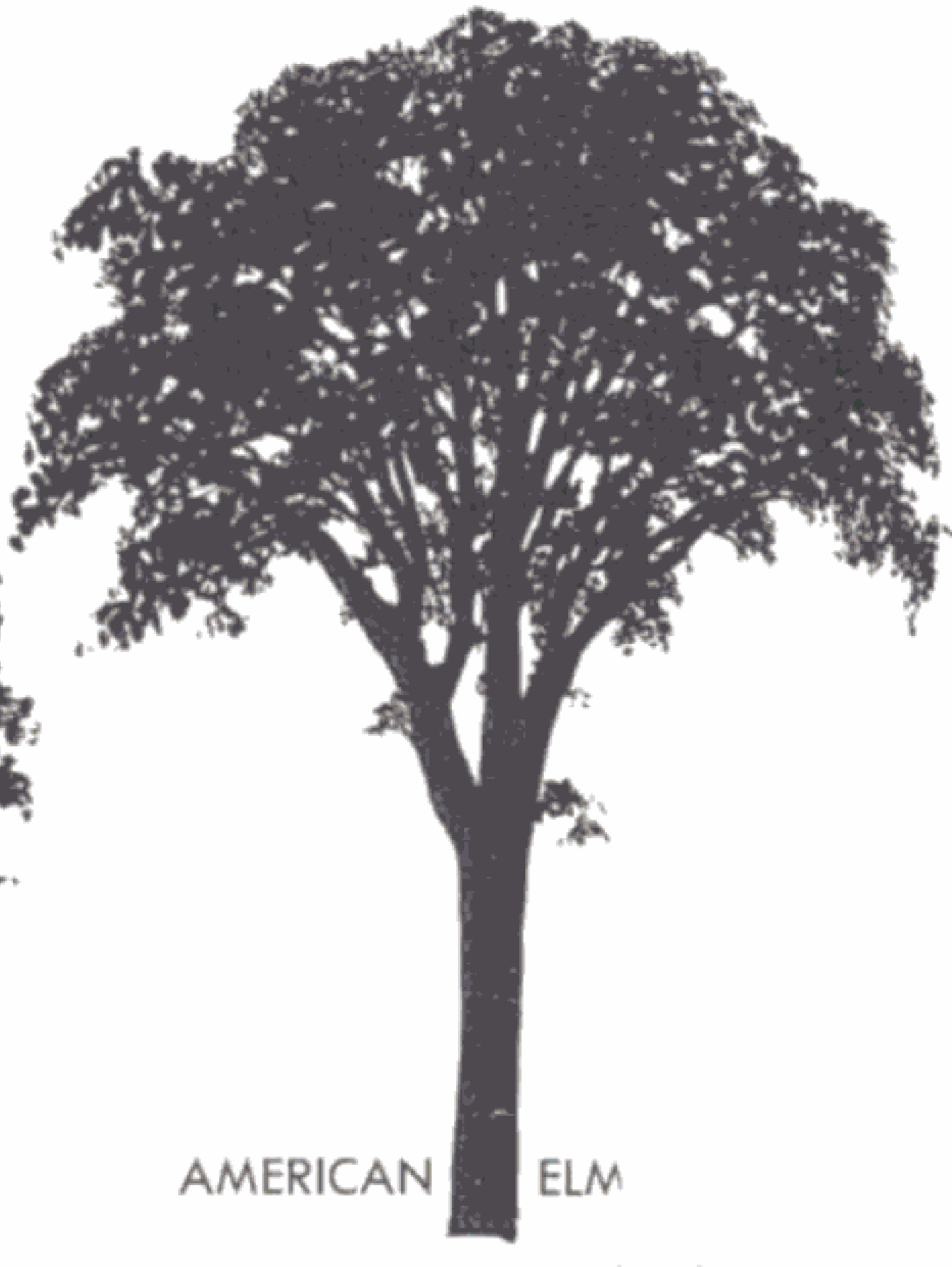
Tall, slender; trunk continuous; many hugging branches


COMMON
CATALPA

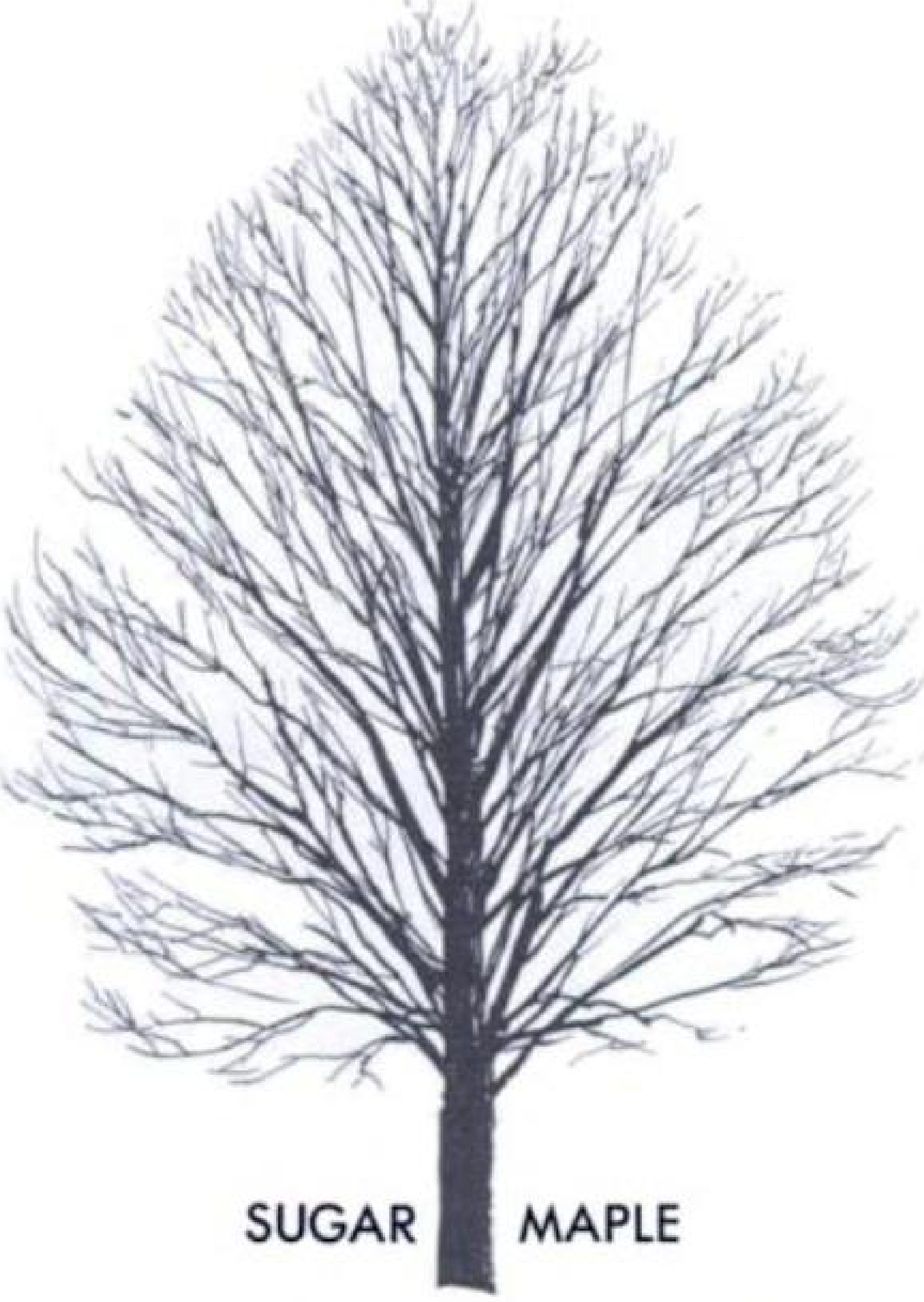
Round-topped; large heart-shaped leaves; long beanlike pods


SUGAR
MAPLE

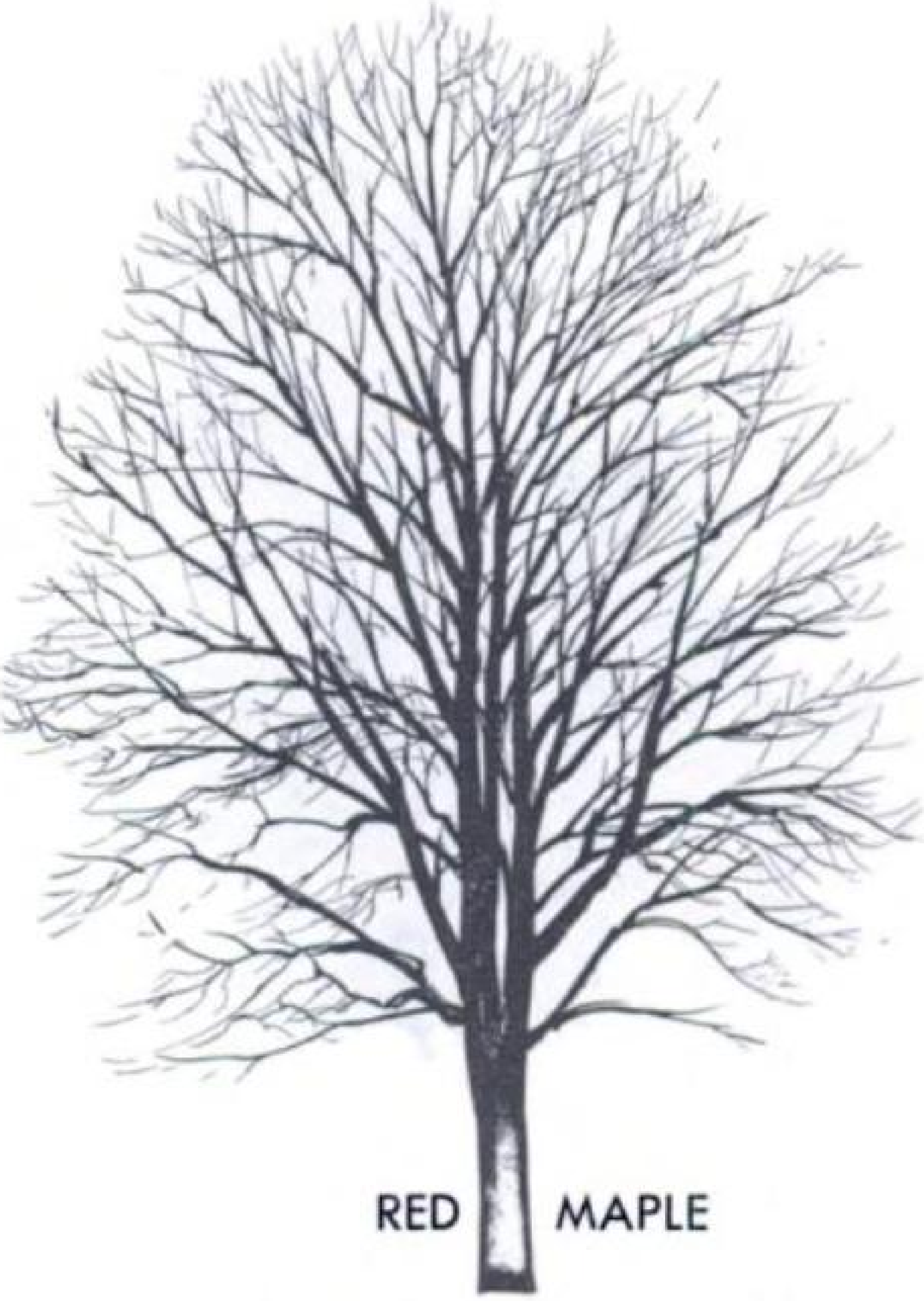
Short stem; full egg-shaped head


AMERICAN
ELM

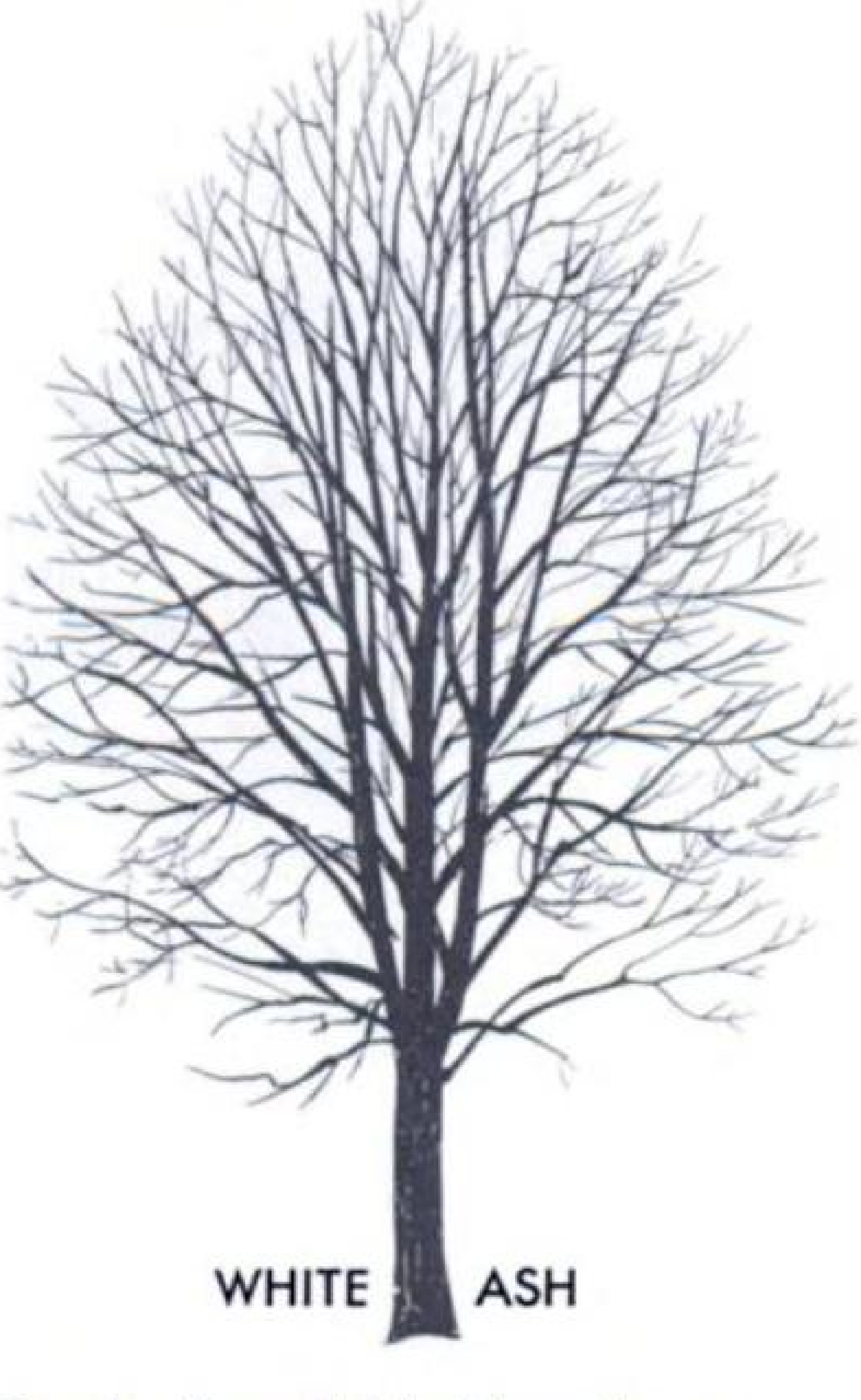
Vase-shaped; trunk divided into large outspreading limbs


SUGAR MAPLE

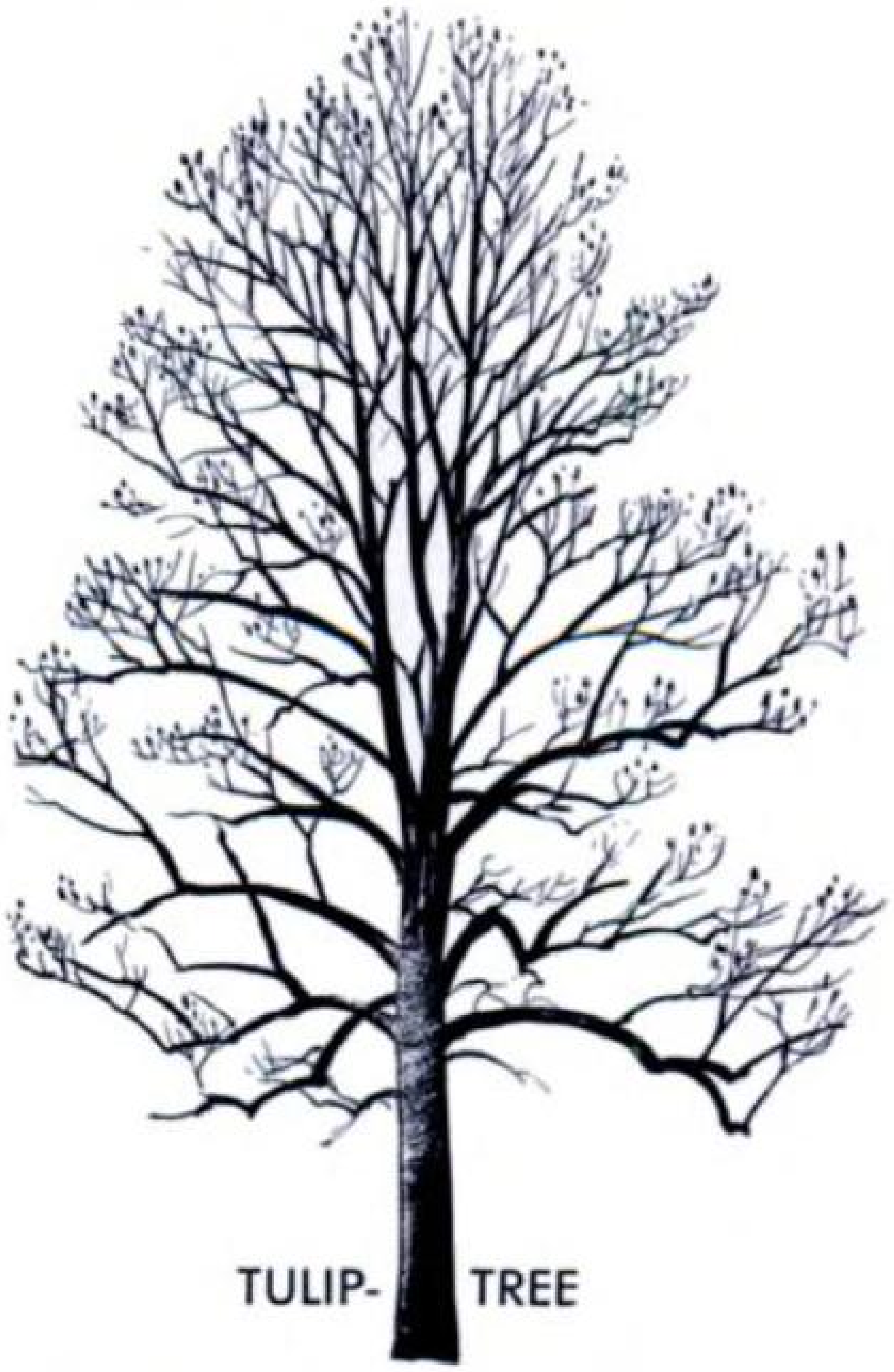
Short trunk; many ascending branches; symmetrical oval head; dark flaky bark


RED MAPLE

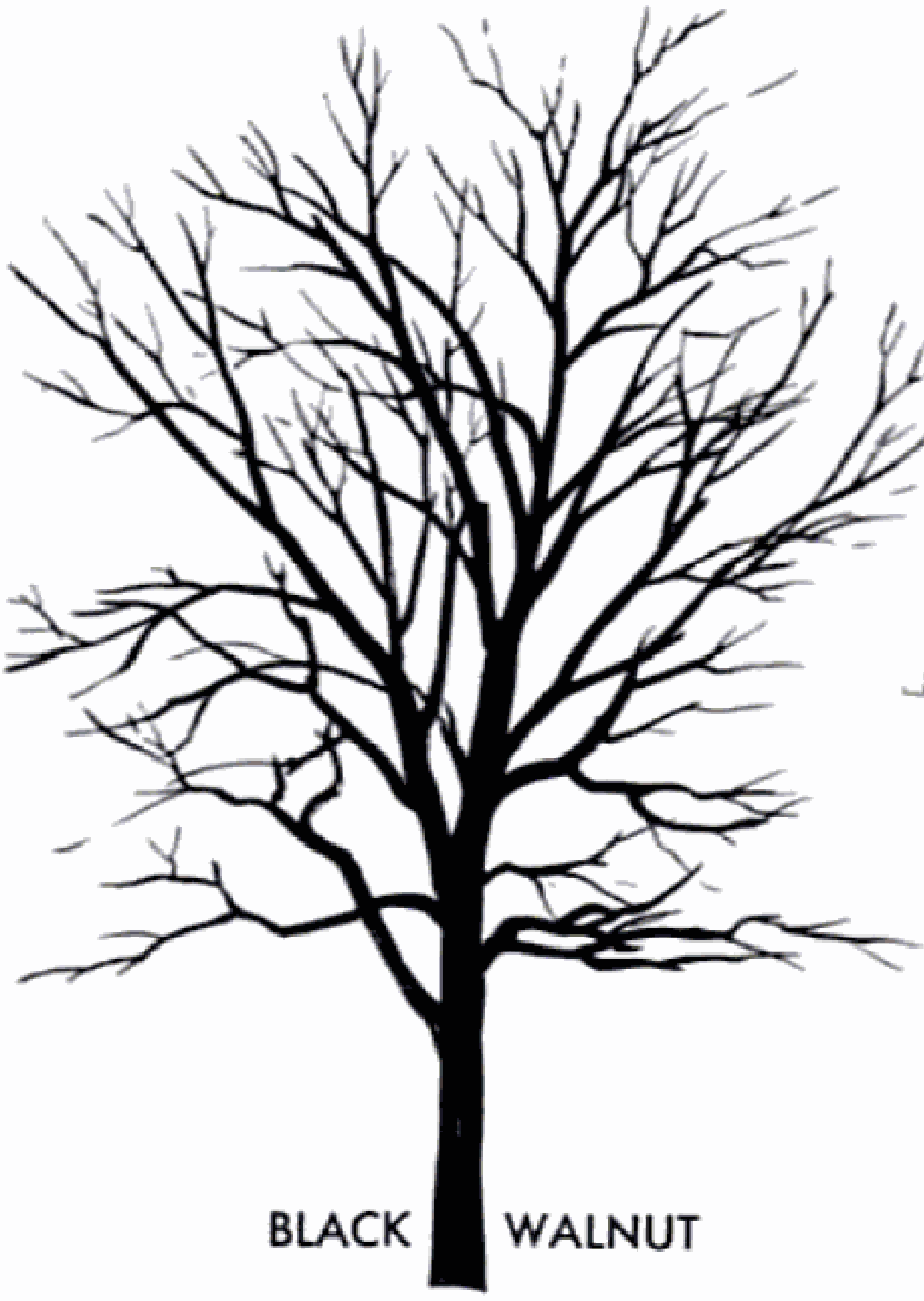
Short trunk; broad oval head (sometimes broader at top); gray beechlike upper branches


WHITE ASH

Trunk often divided low down; oval head; cross-shaped branching; diamond-ridged bark

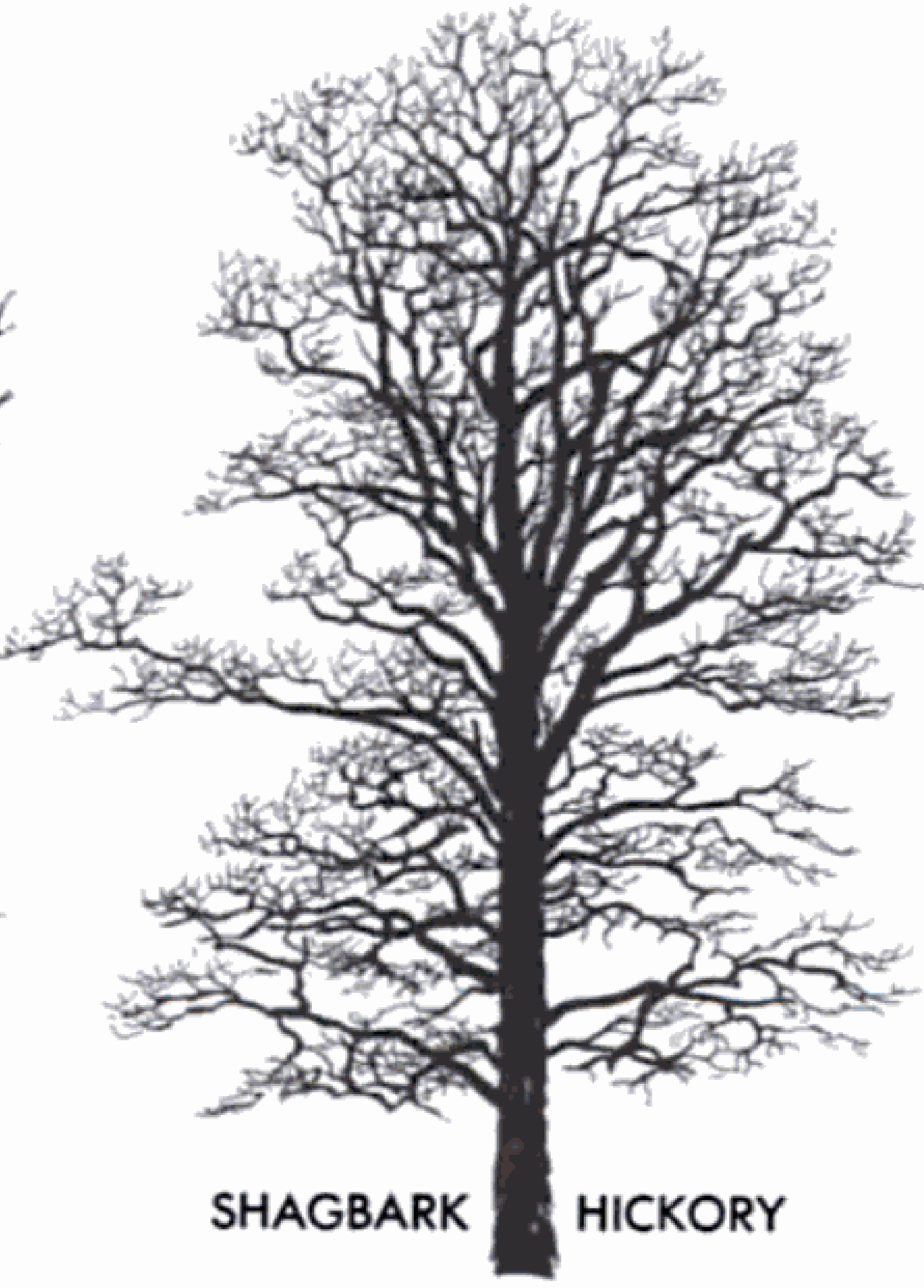

TULIP-TREE

Upright trunk; branches often angle upward; erect dry seed cones



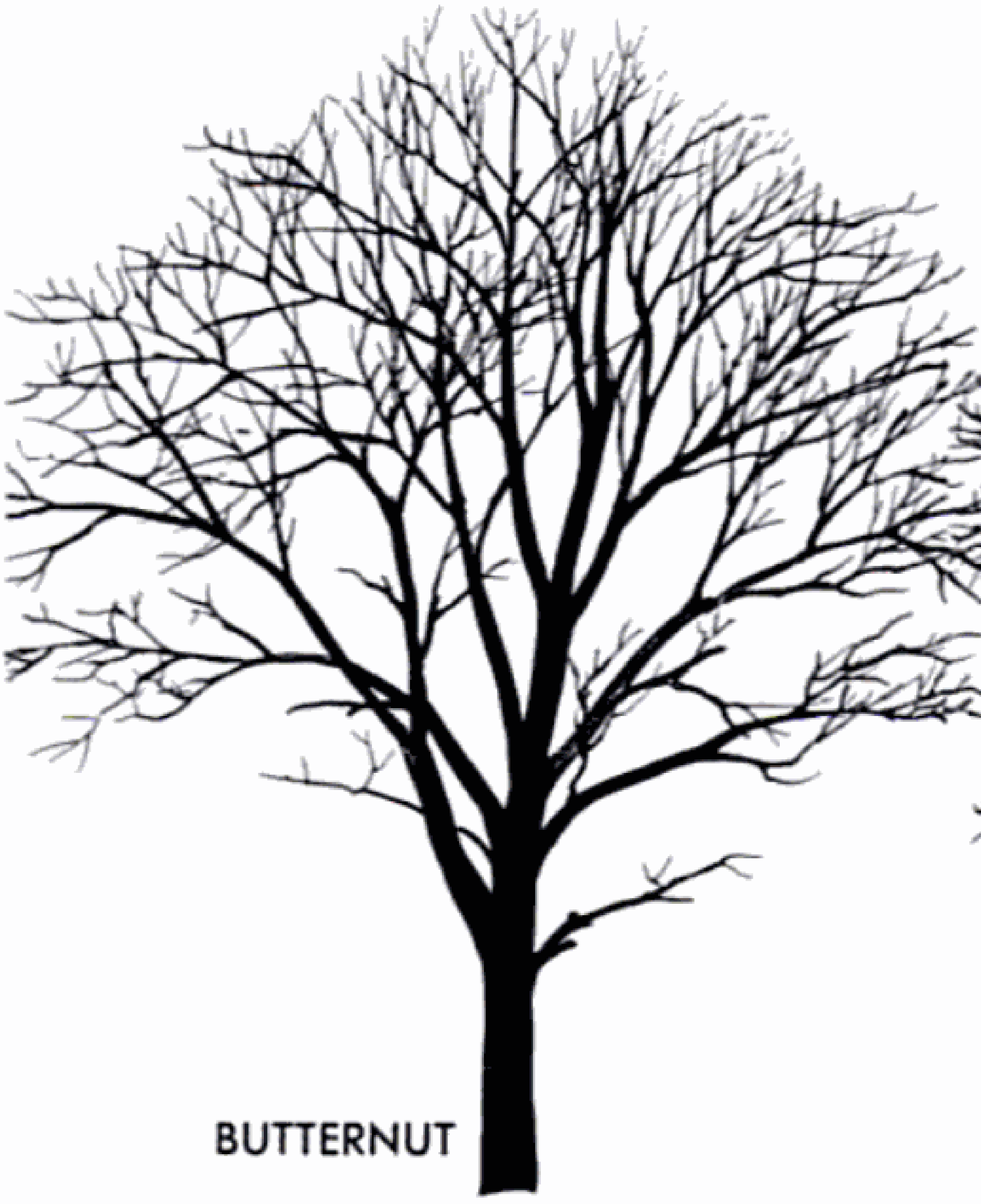
BLACK WALNUT

Sharply divided trunk; heavy alternate branches; open spreading head



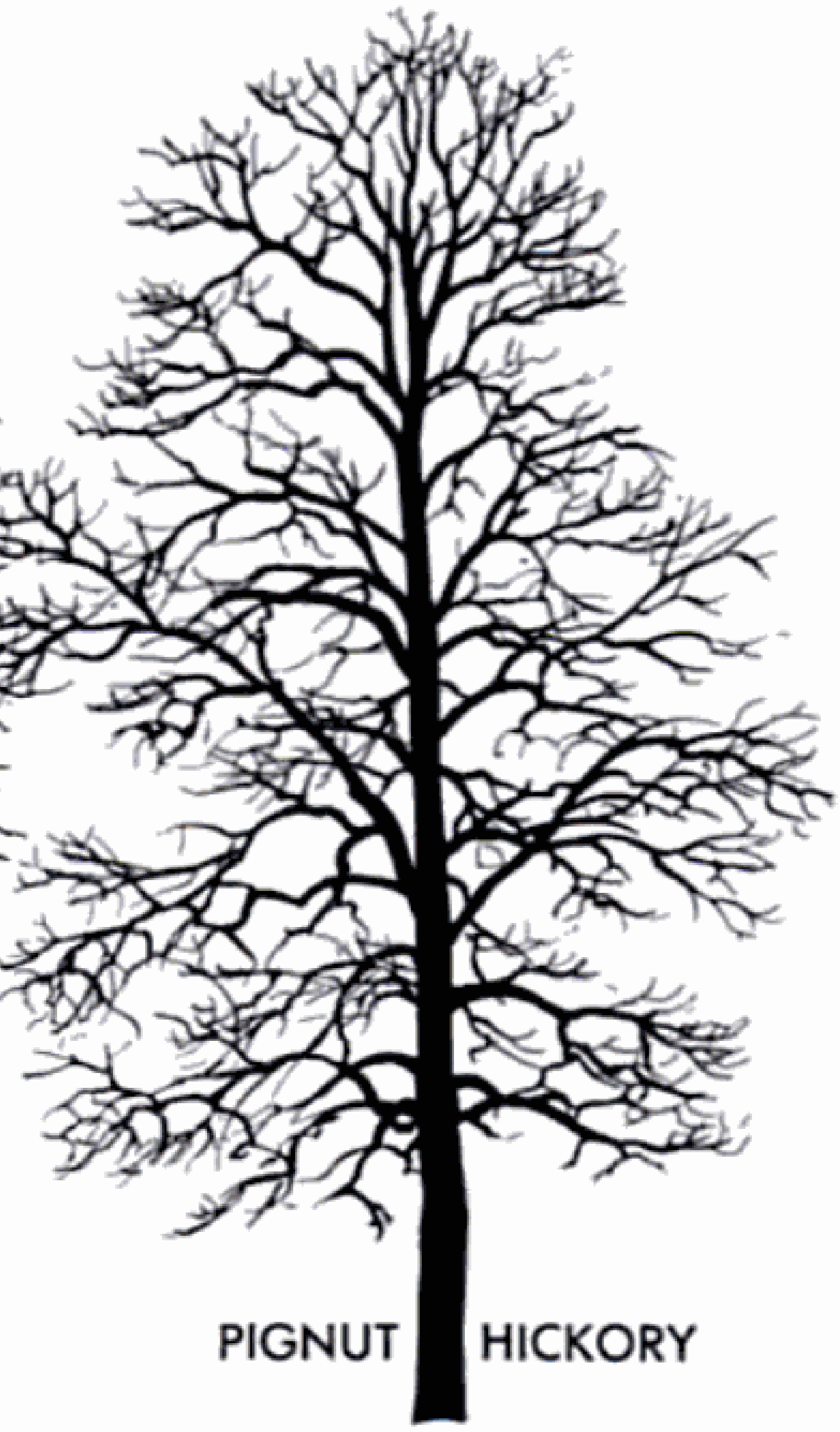
SHAGBARK HICKORY

Oblong; very shaggy bark (may be less twiggy, longer trunked)



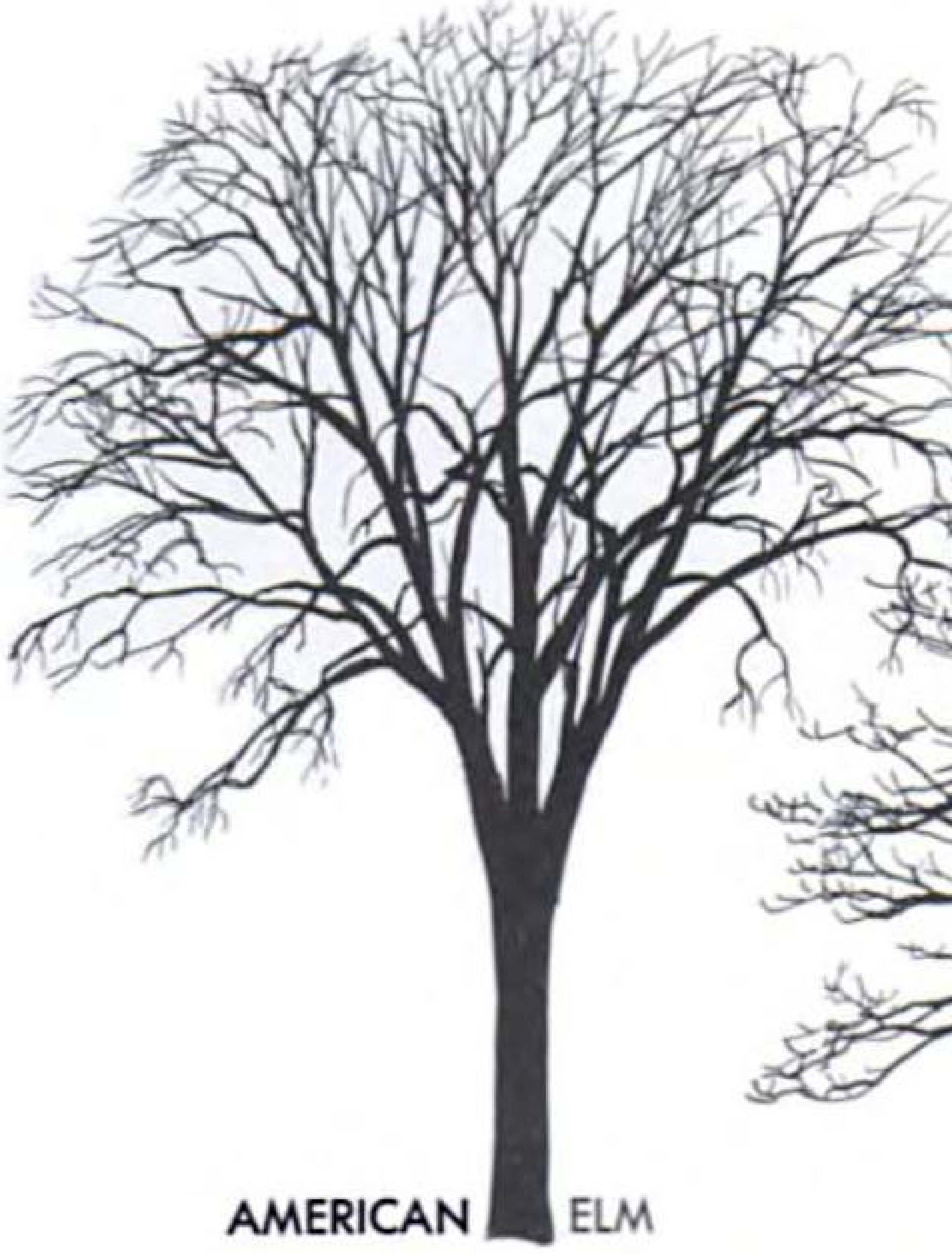
BUTTERNUT

Round-topped or like inverted triangle; Y-like branches



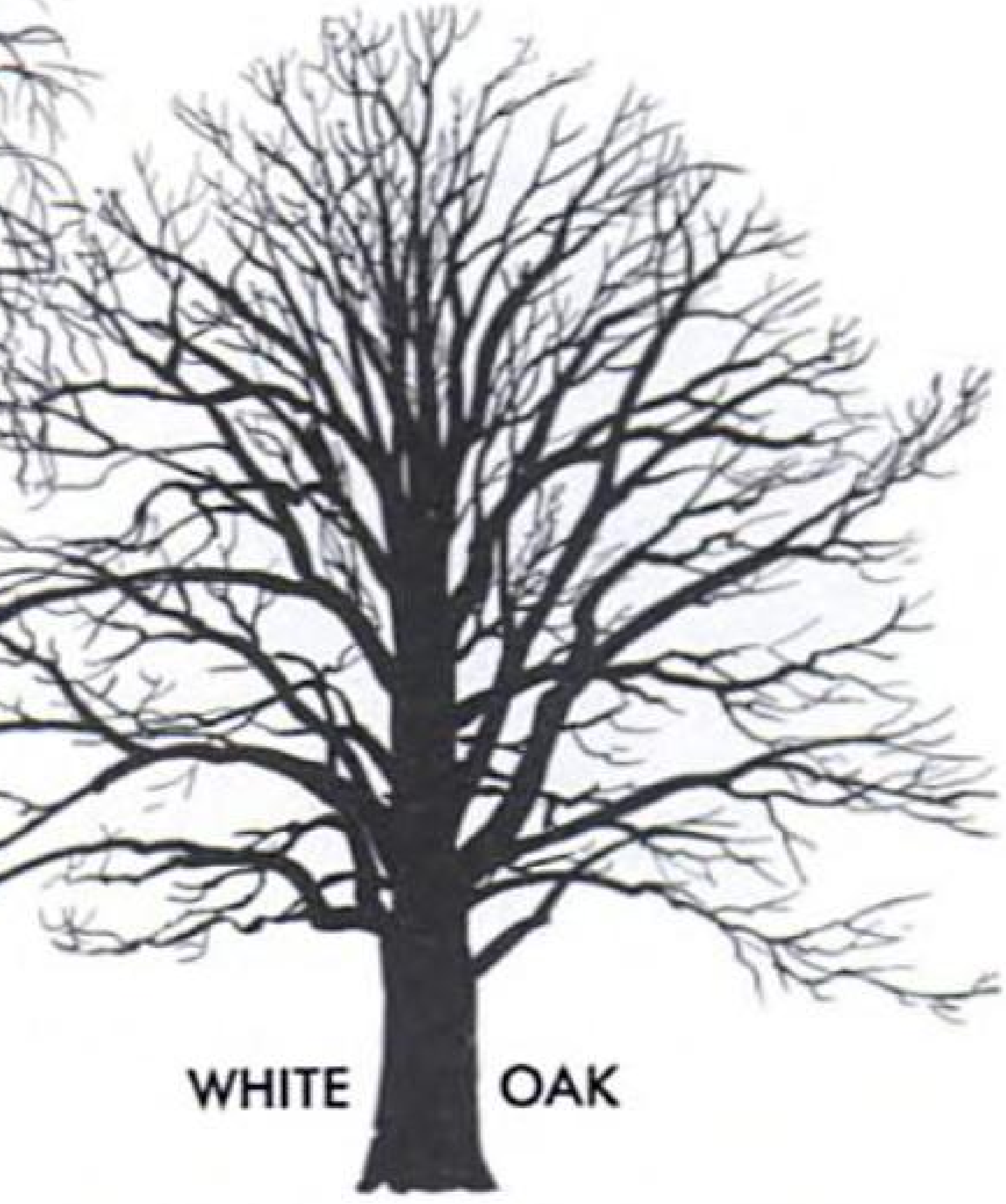
PIGNUT HICKORY

Narrow oblong head; tight bark; contorted branches



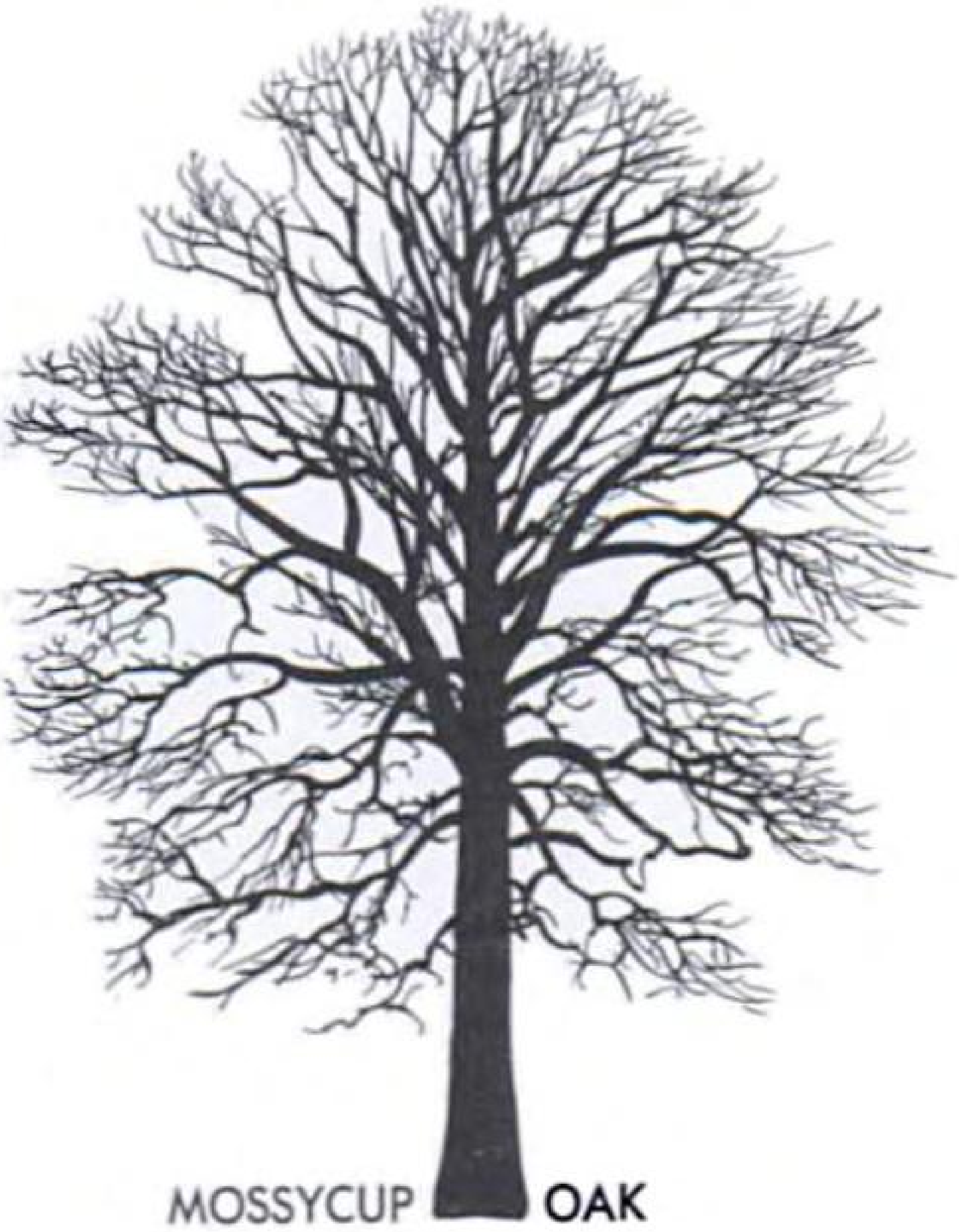
AMERICAN ELM

Vase-shaped; trunk divided into large outspreading branches



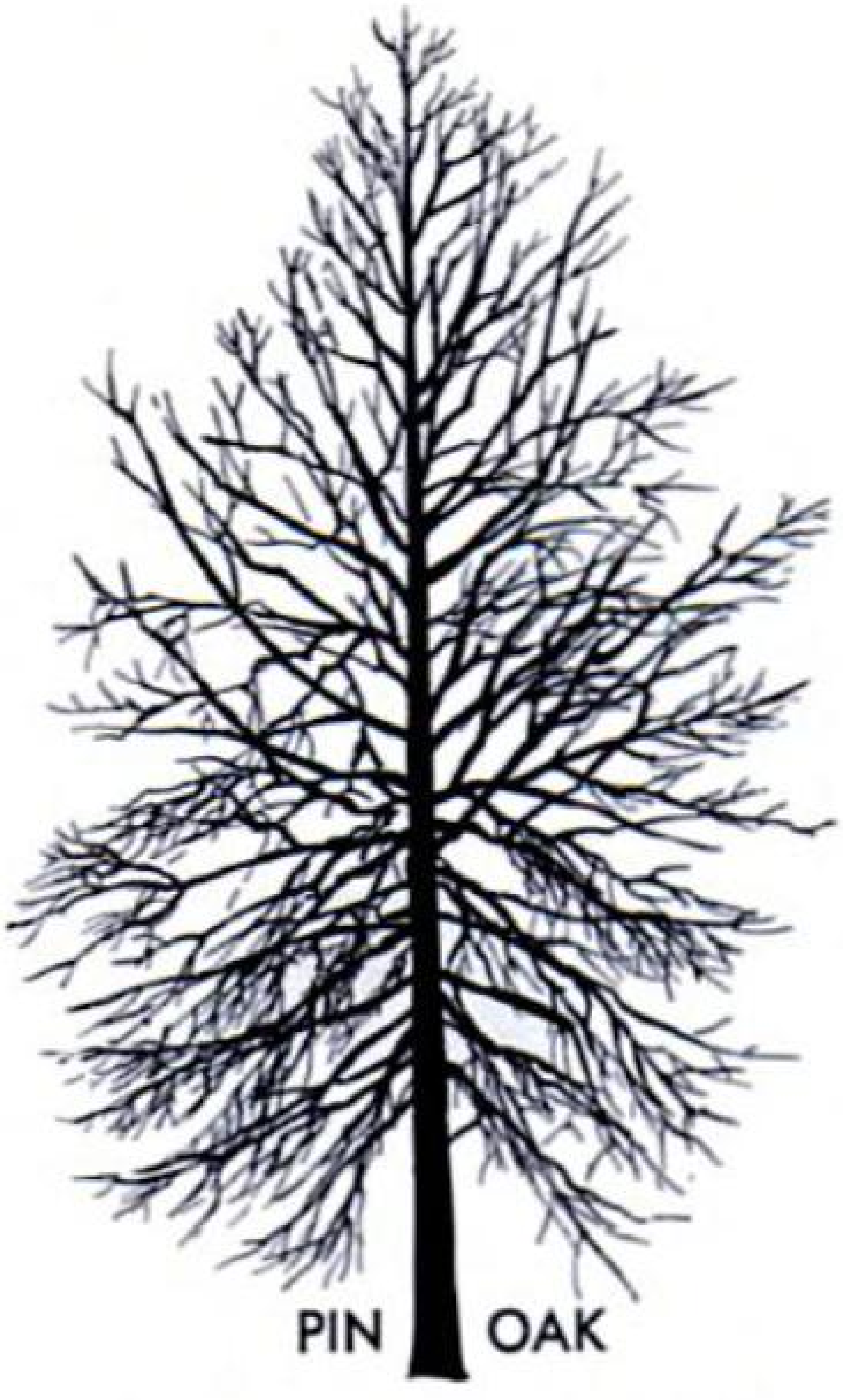
WHITE OAK

Broader than tall; short trunk, branches gnarled



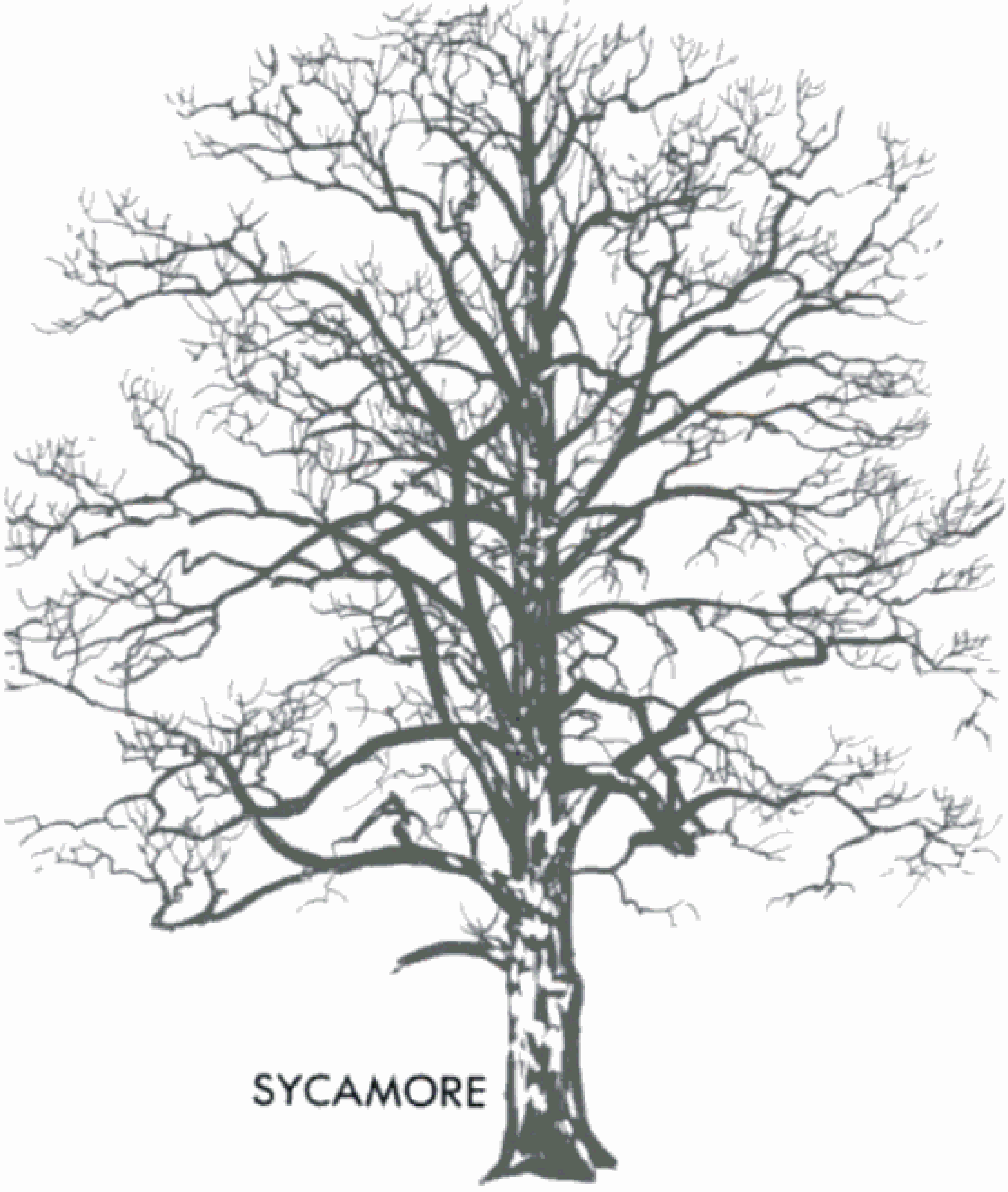
MOSSYCUP OAK

Broad round top; spreading; lower limbs often drooping



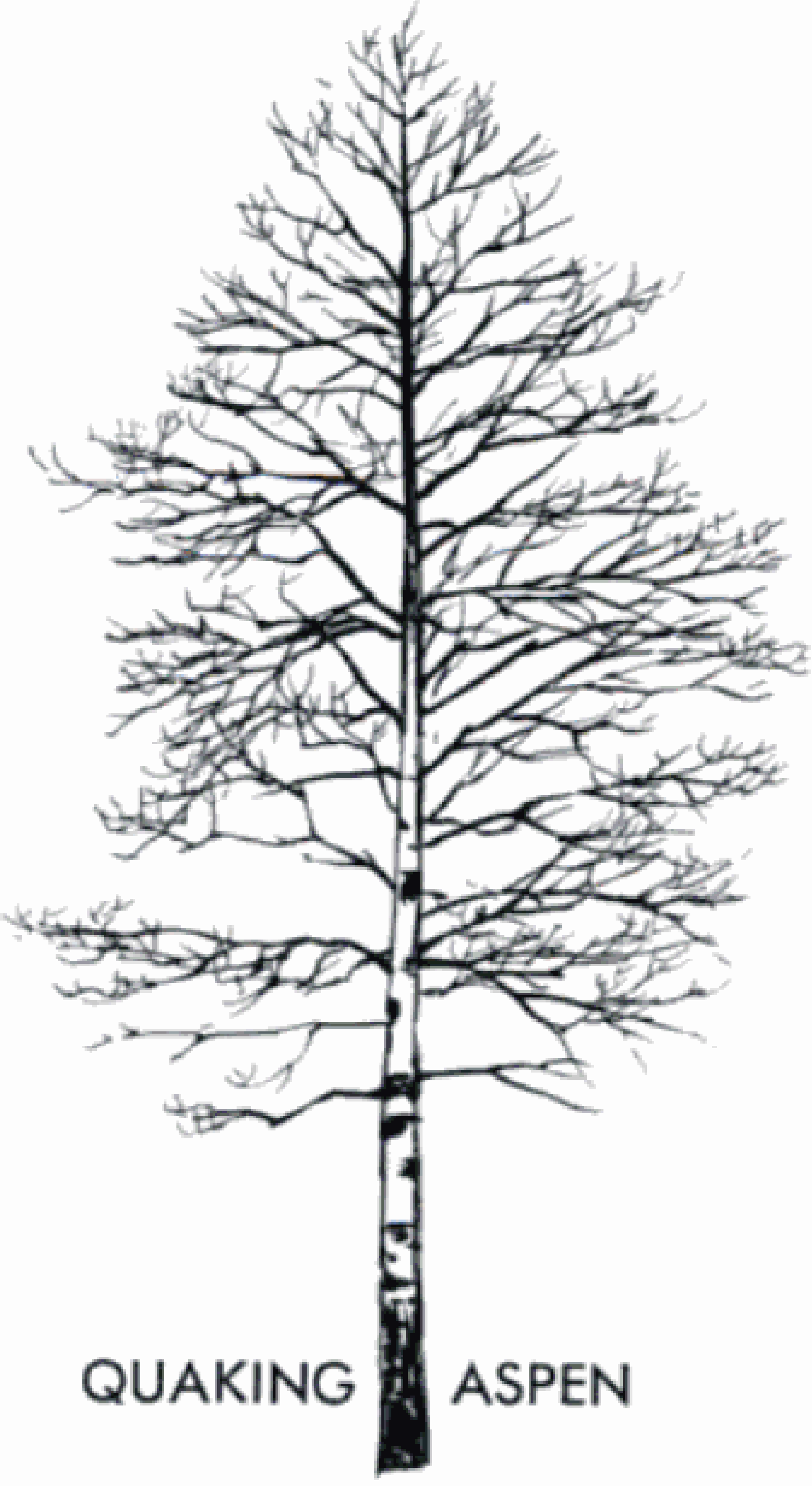
PIN OAK

Upper branches ascending; lower branches drooping



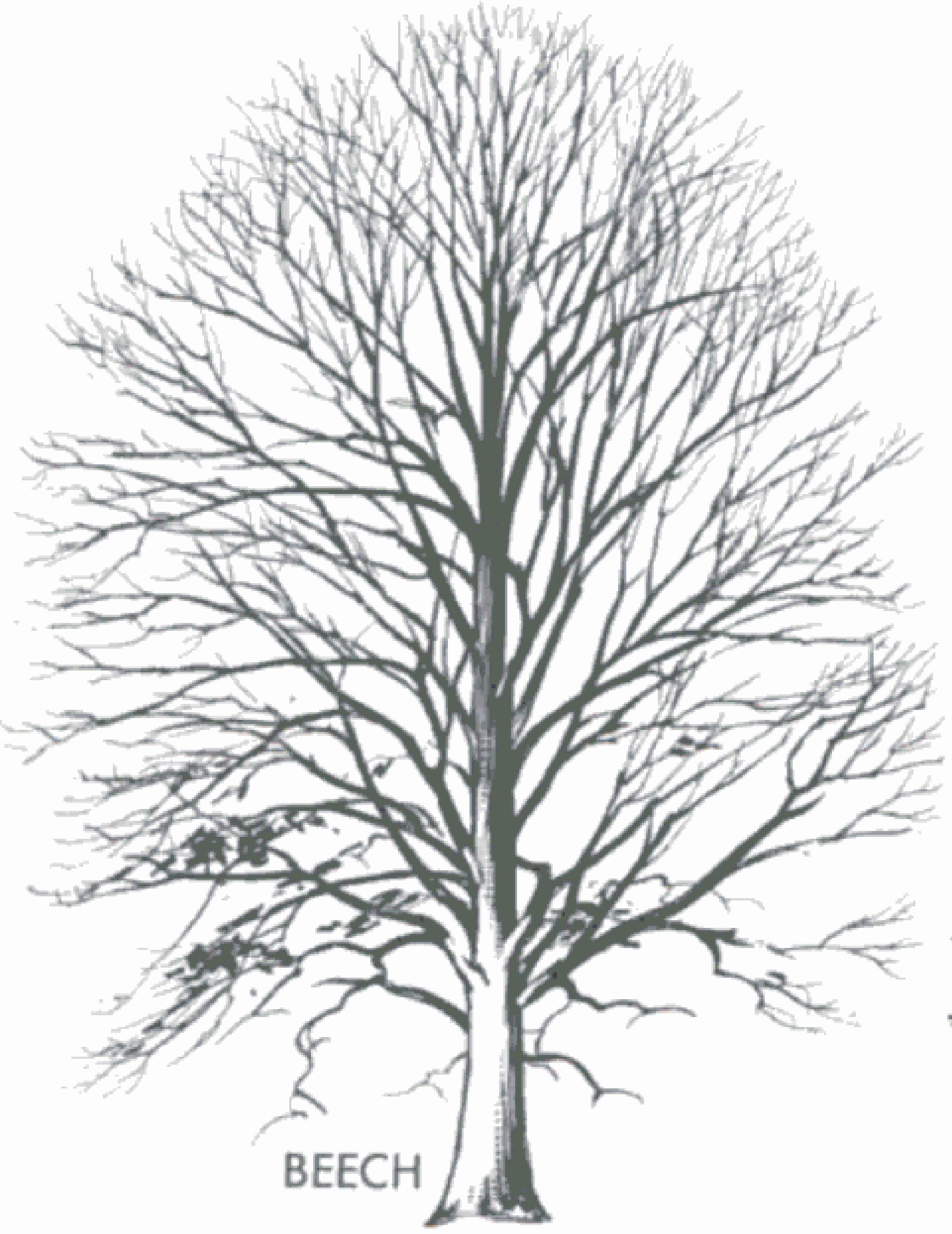
SYCAMORE

Large, open, irregular;
bark in patches revealing
whitish under bark



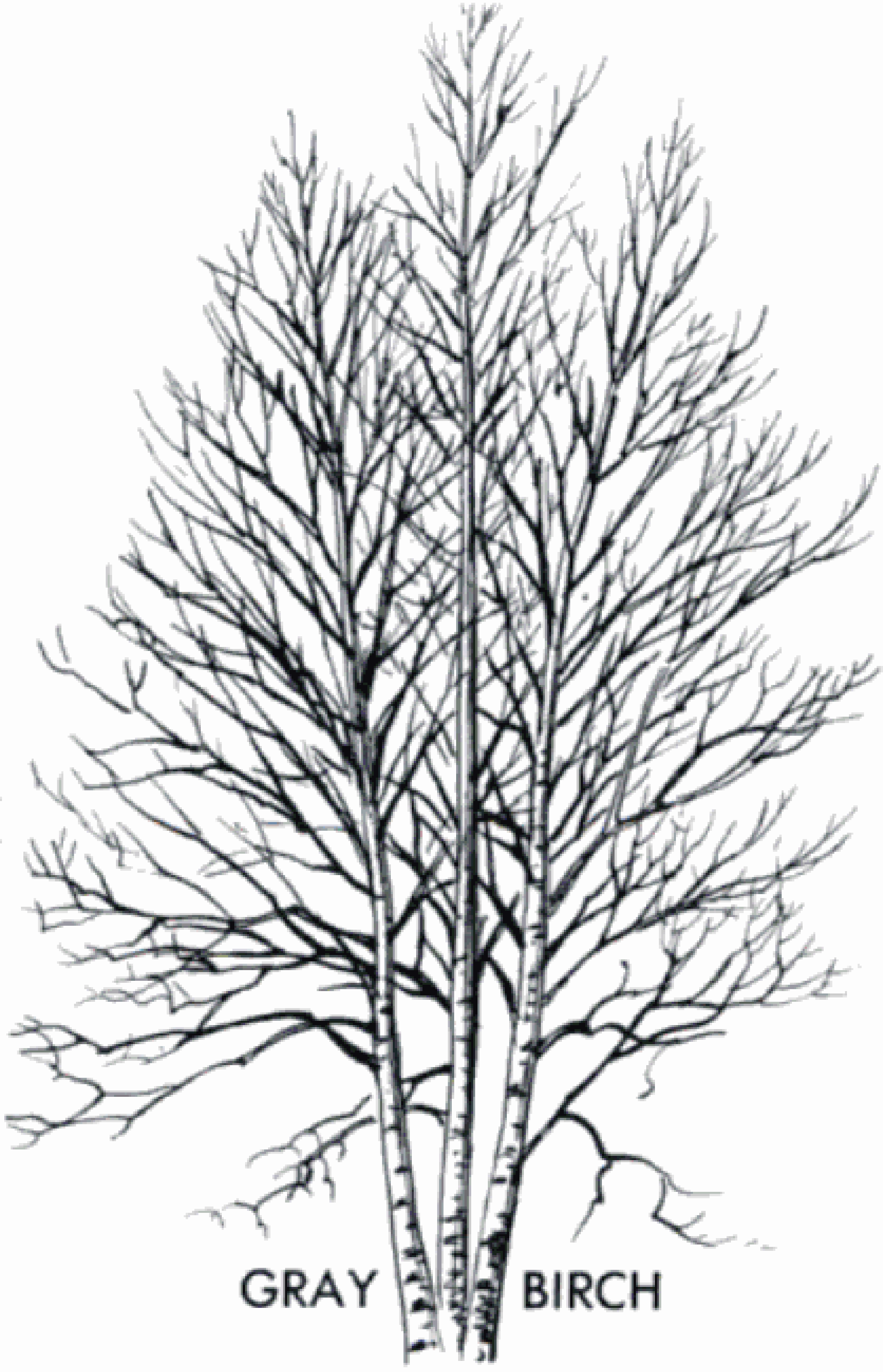
QUAKING ASPEN

Upper bark whitish with dark
blotches; reddish-brown twigs



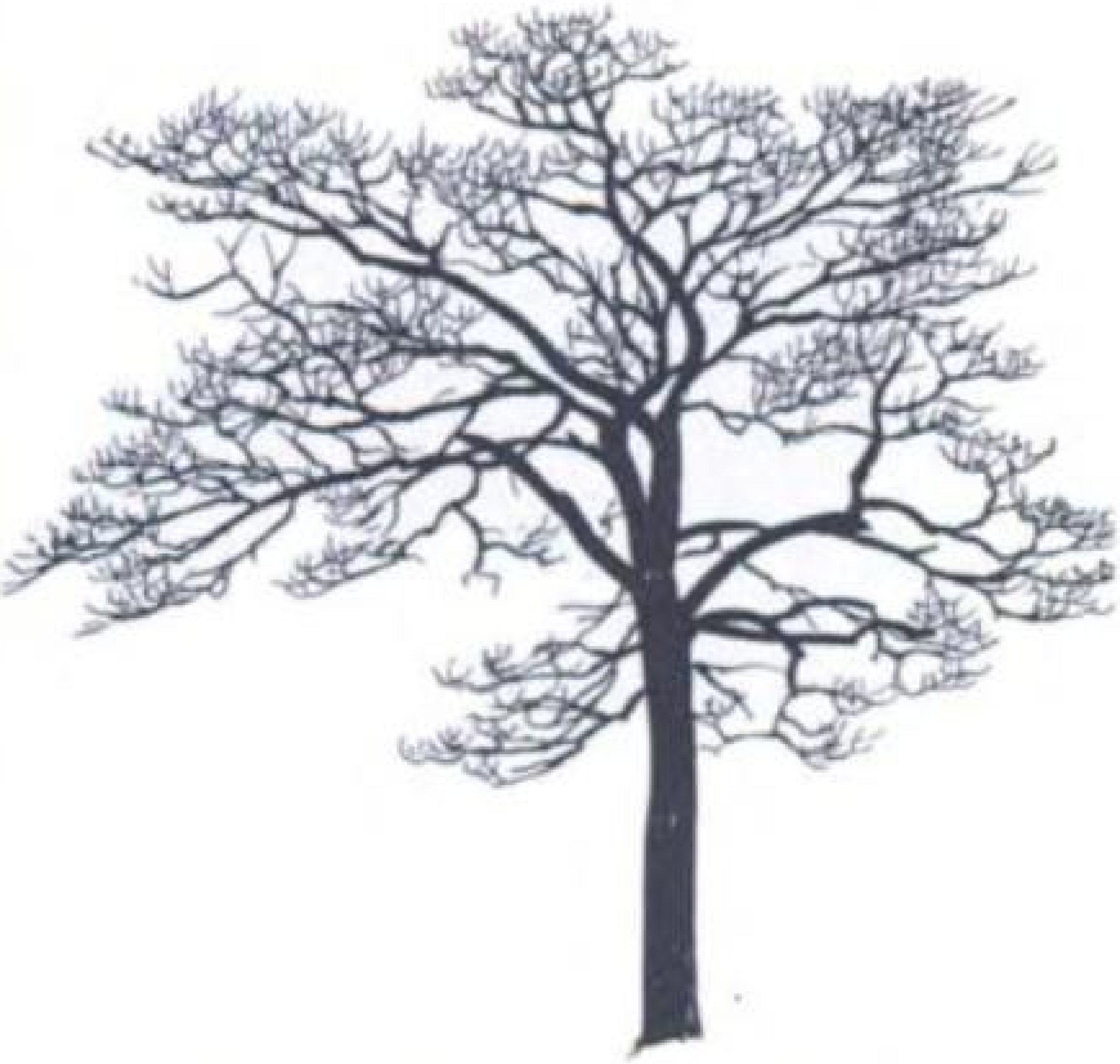
BEECH

Smooth light gray bark;
dense ovate head; often a few
persistent leaves



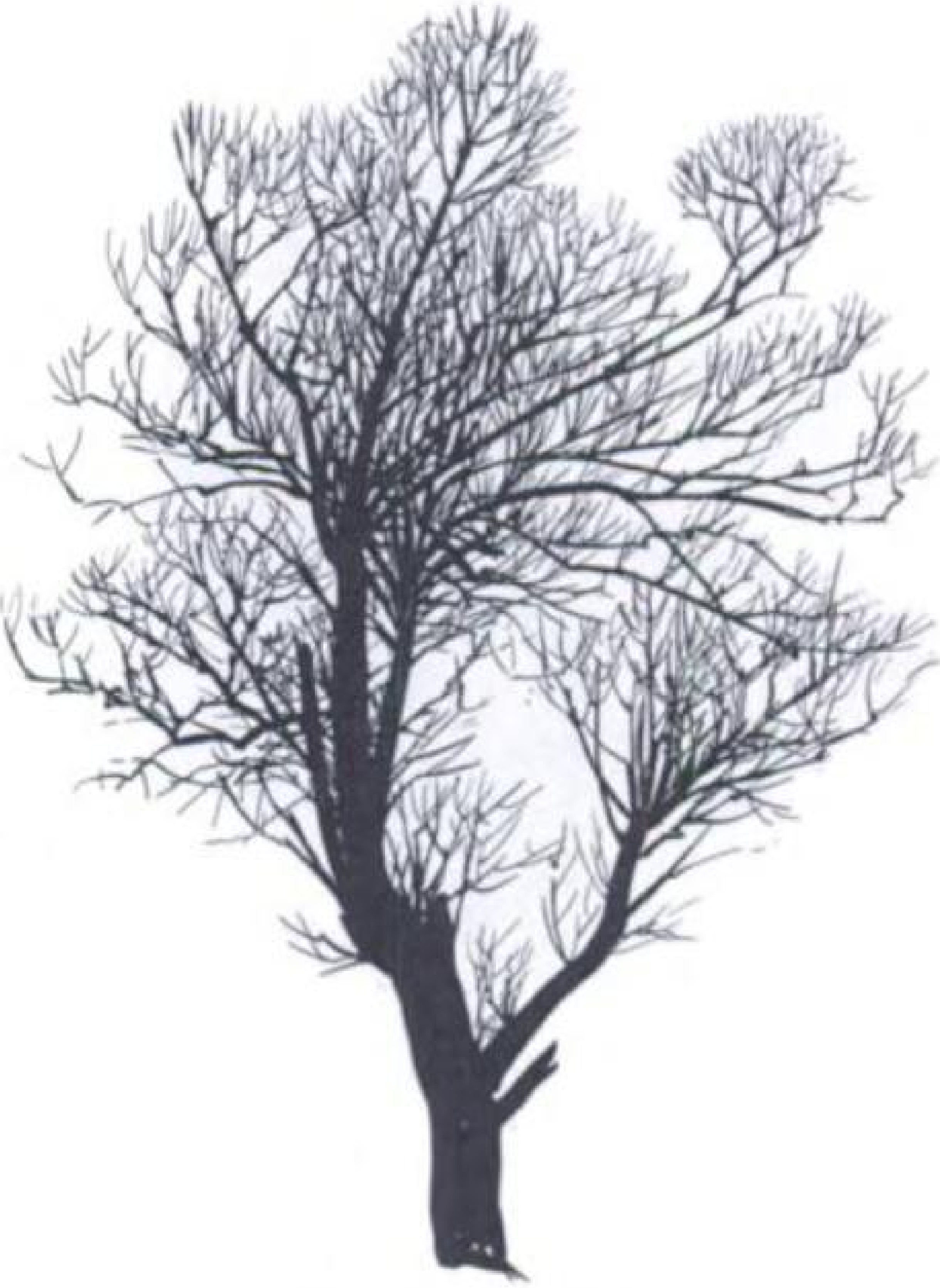
GRAY BIRCH

Often clumped; chalky bark
(not peeling) with dark triangular
patches; slender twigs



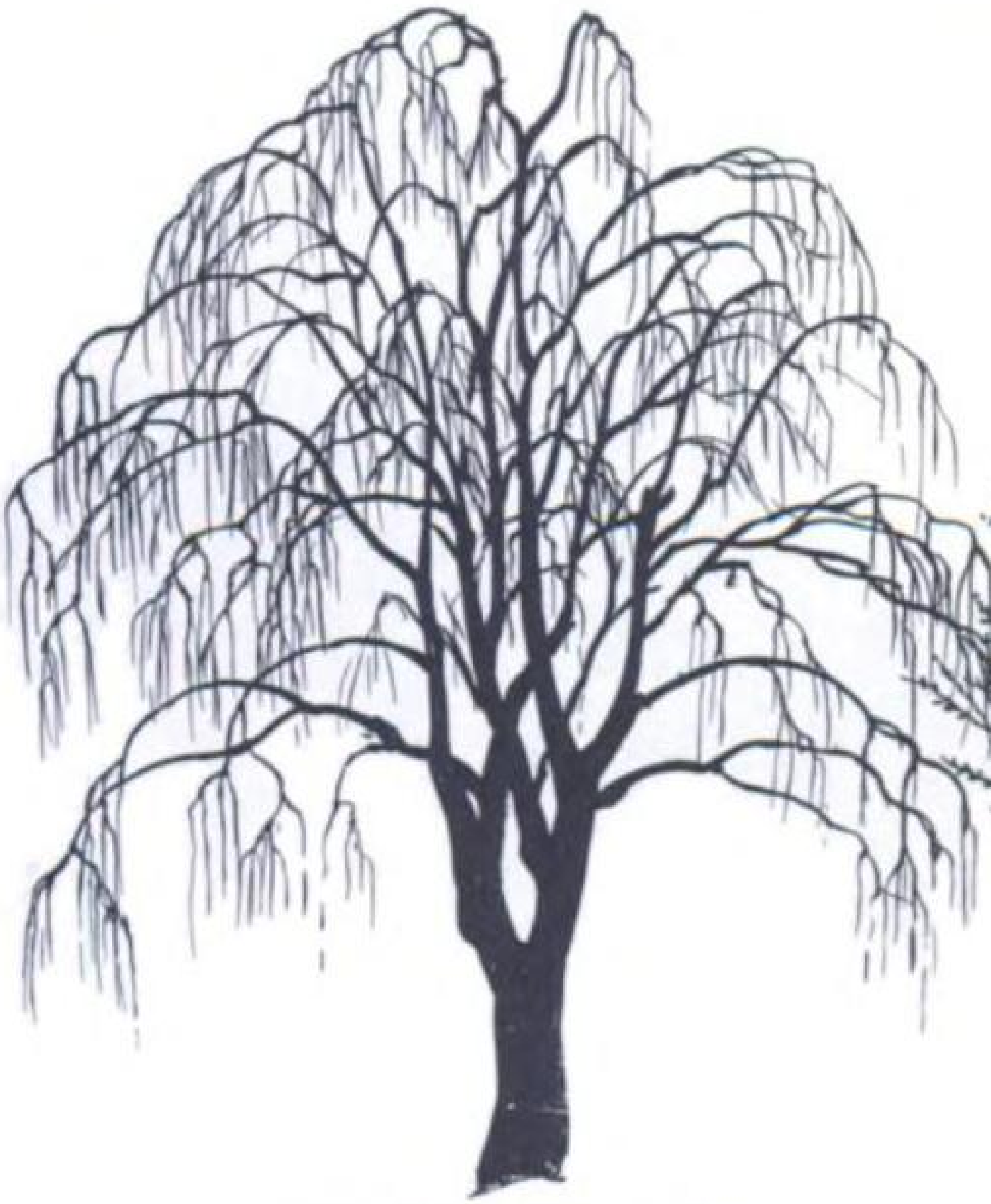
FLOWERING DOGWOOD

Spreading bushy head; conspicuous erect flower buds at ends of twigs



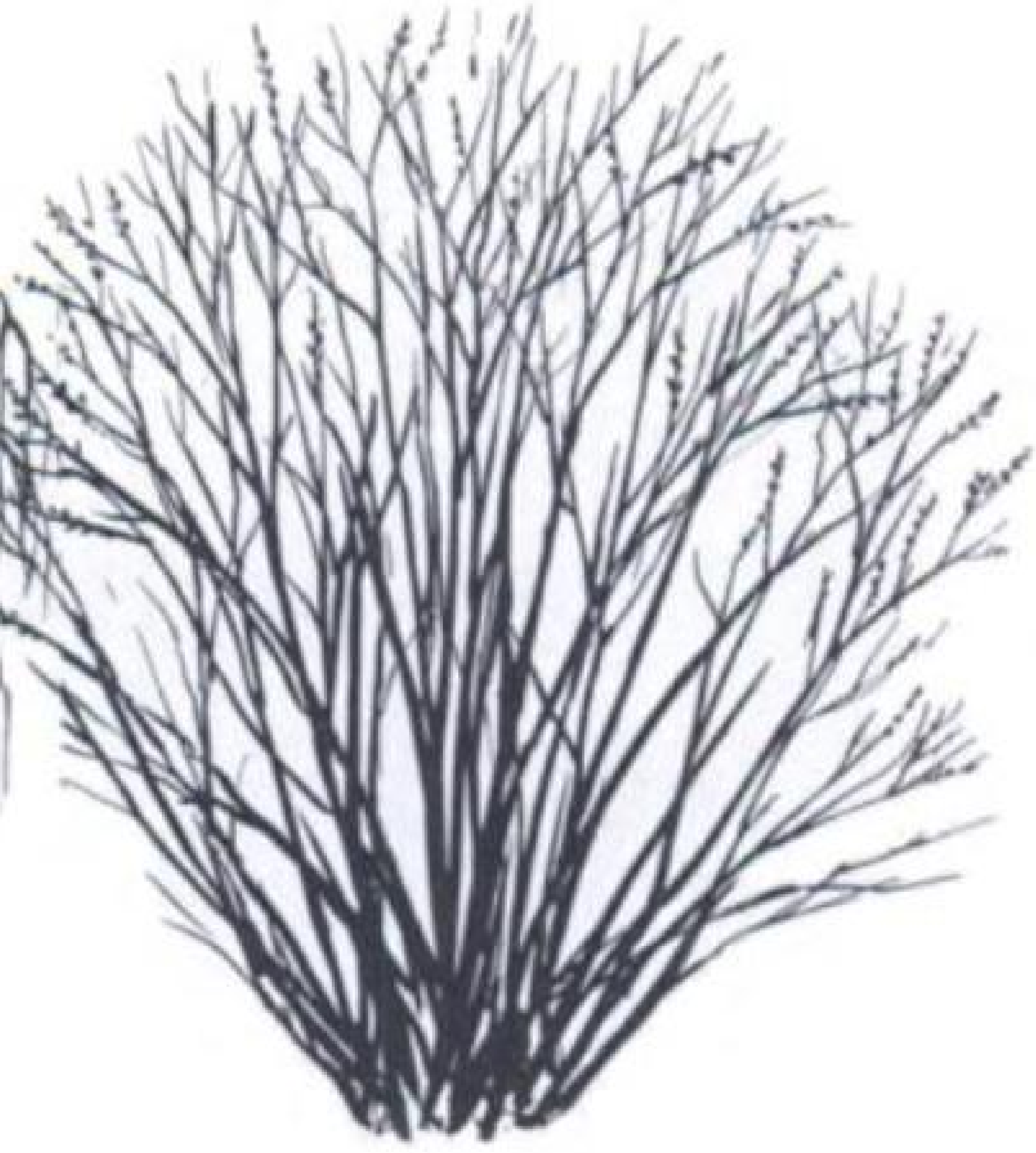
BLACK WILLOW

Disheveled-looking; much branched, often many shoots and suckers



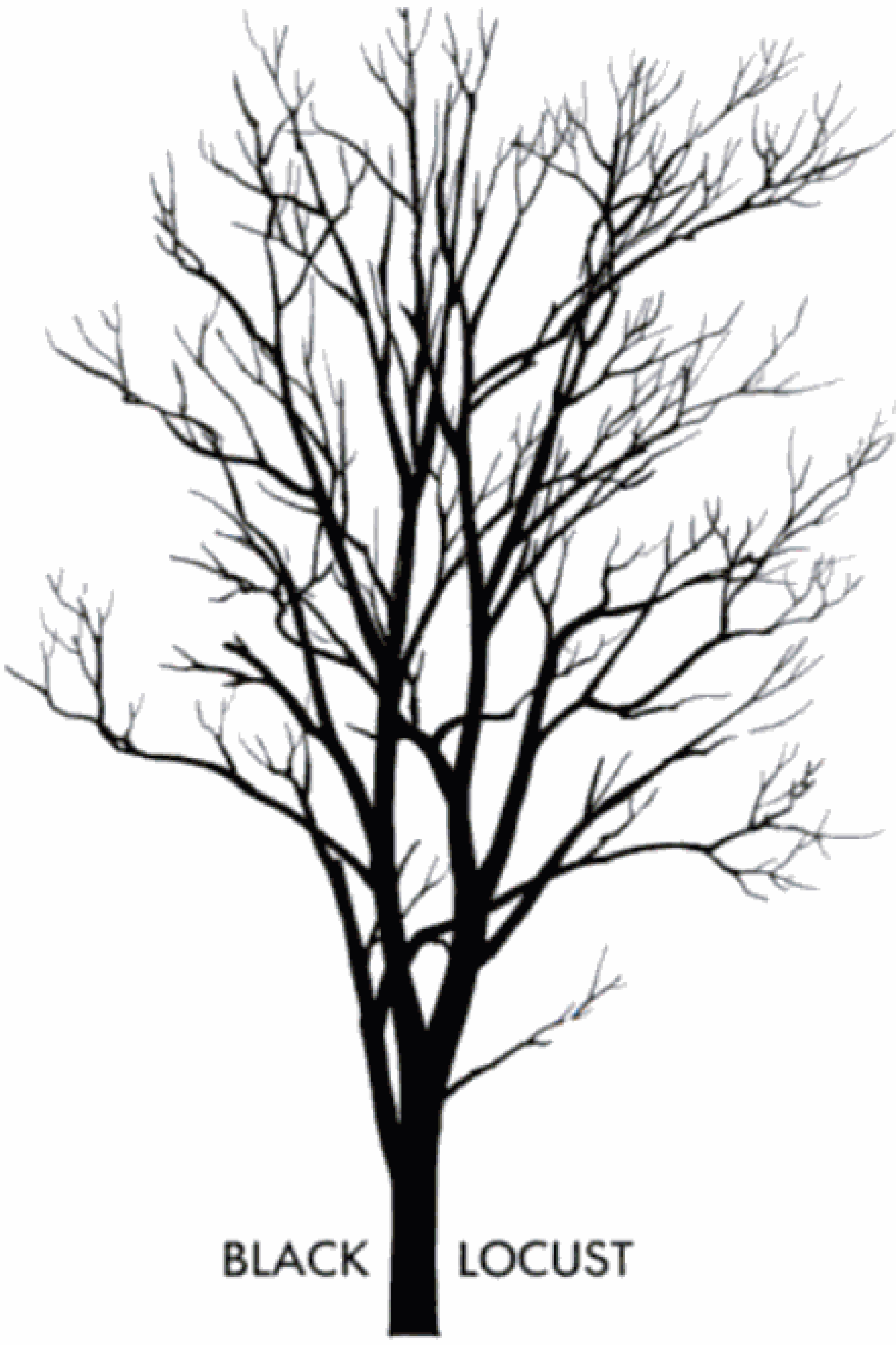
WEEPING WILLOW

Drooping twigs and branches



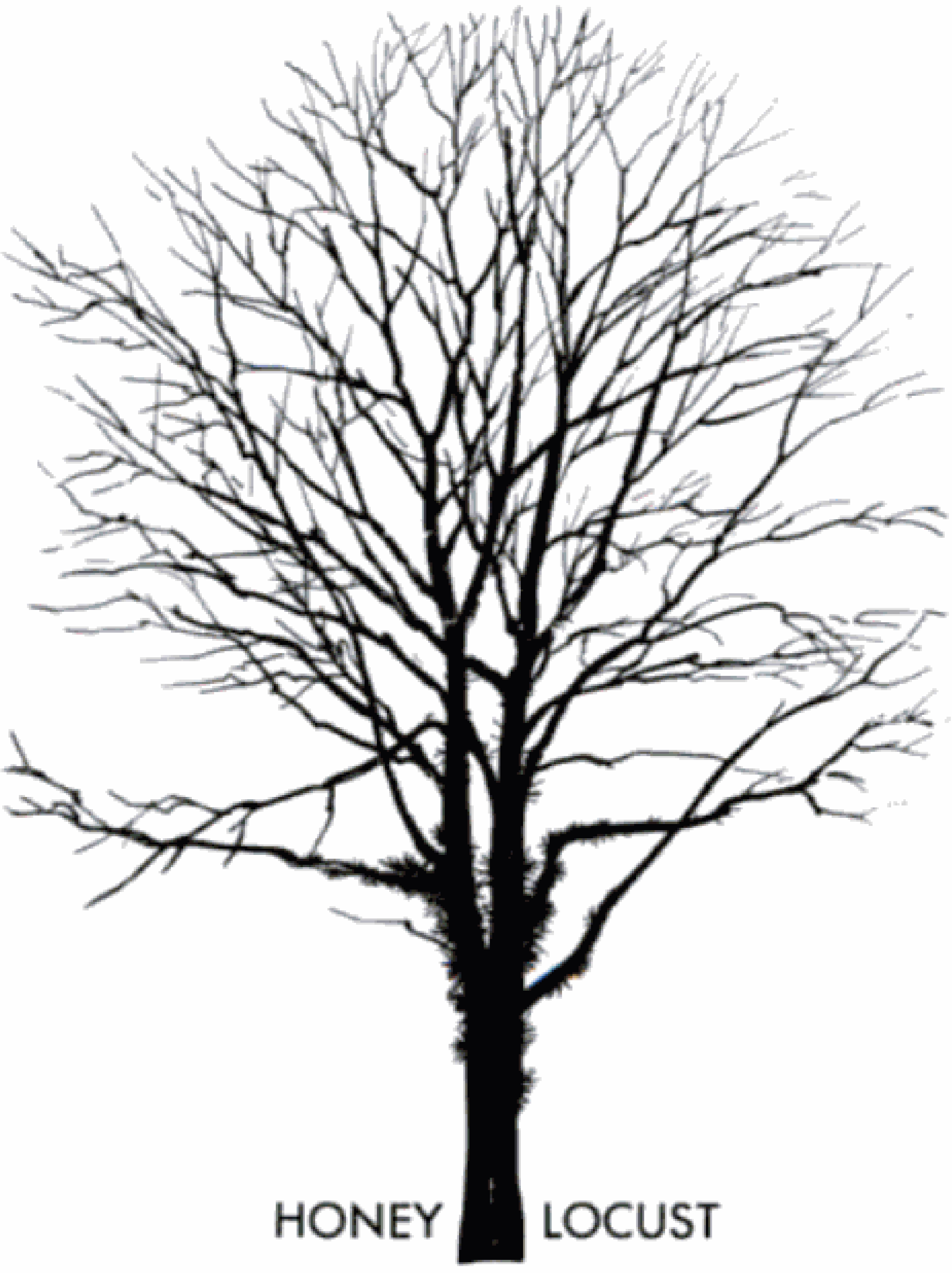
PUSSY WILLOW

Clumped; catkins evident in early spring



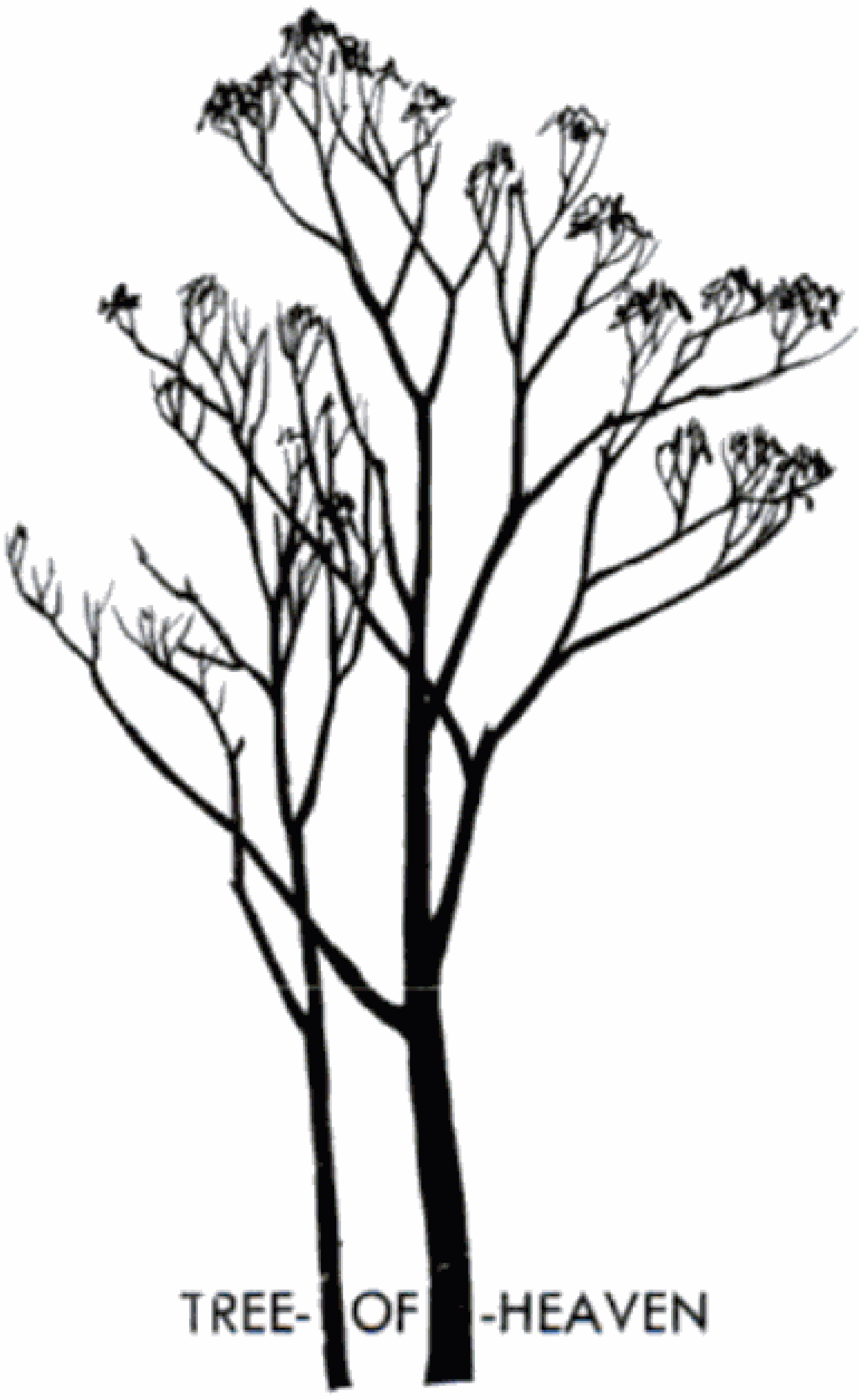
BLACK LOCUST

Trunk usually divided; oblong head, scraggly branches



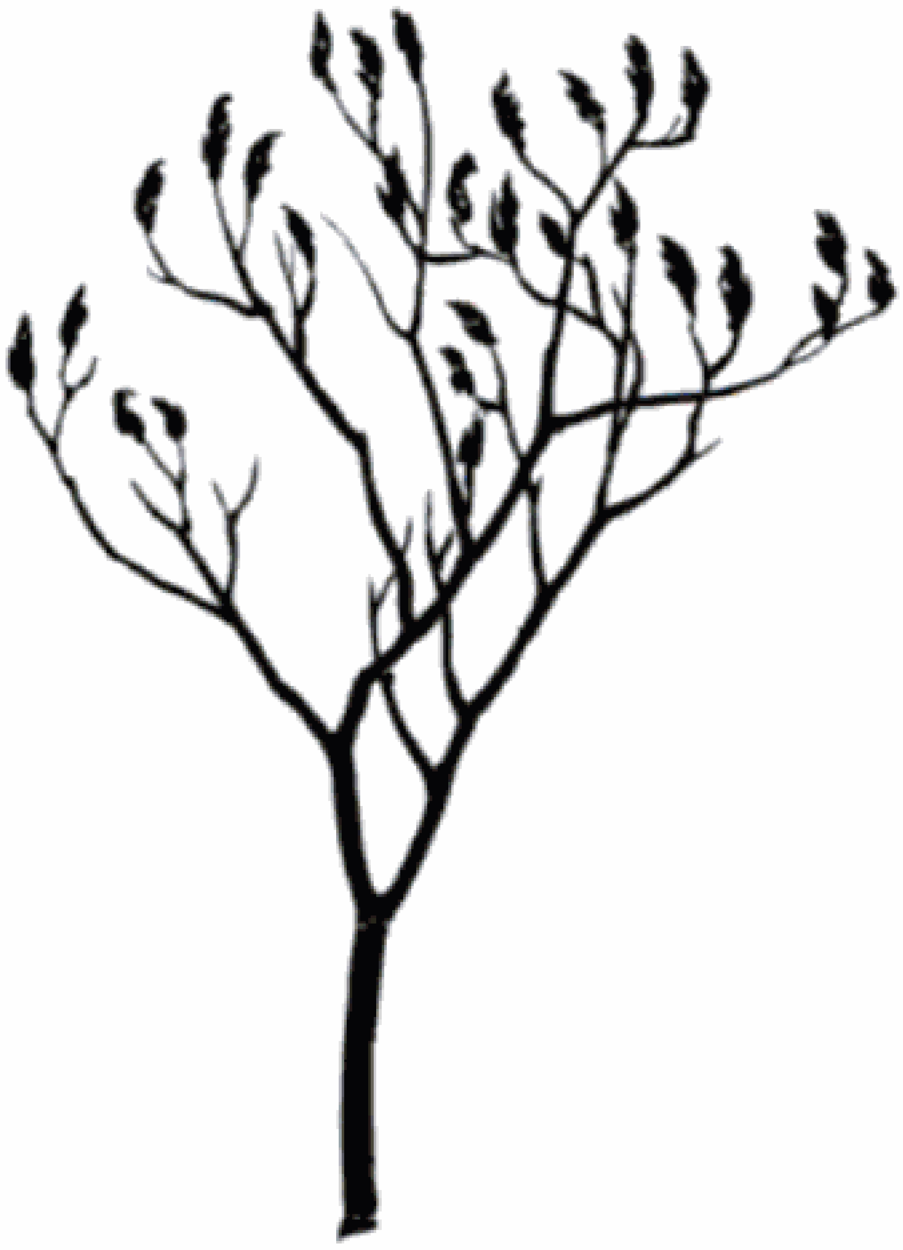
HONEY LOCUST

Short trunk, broad rounded or flat-topped head; thorny at bases of branches



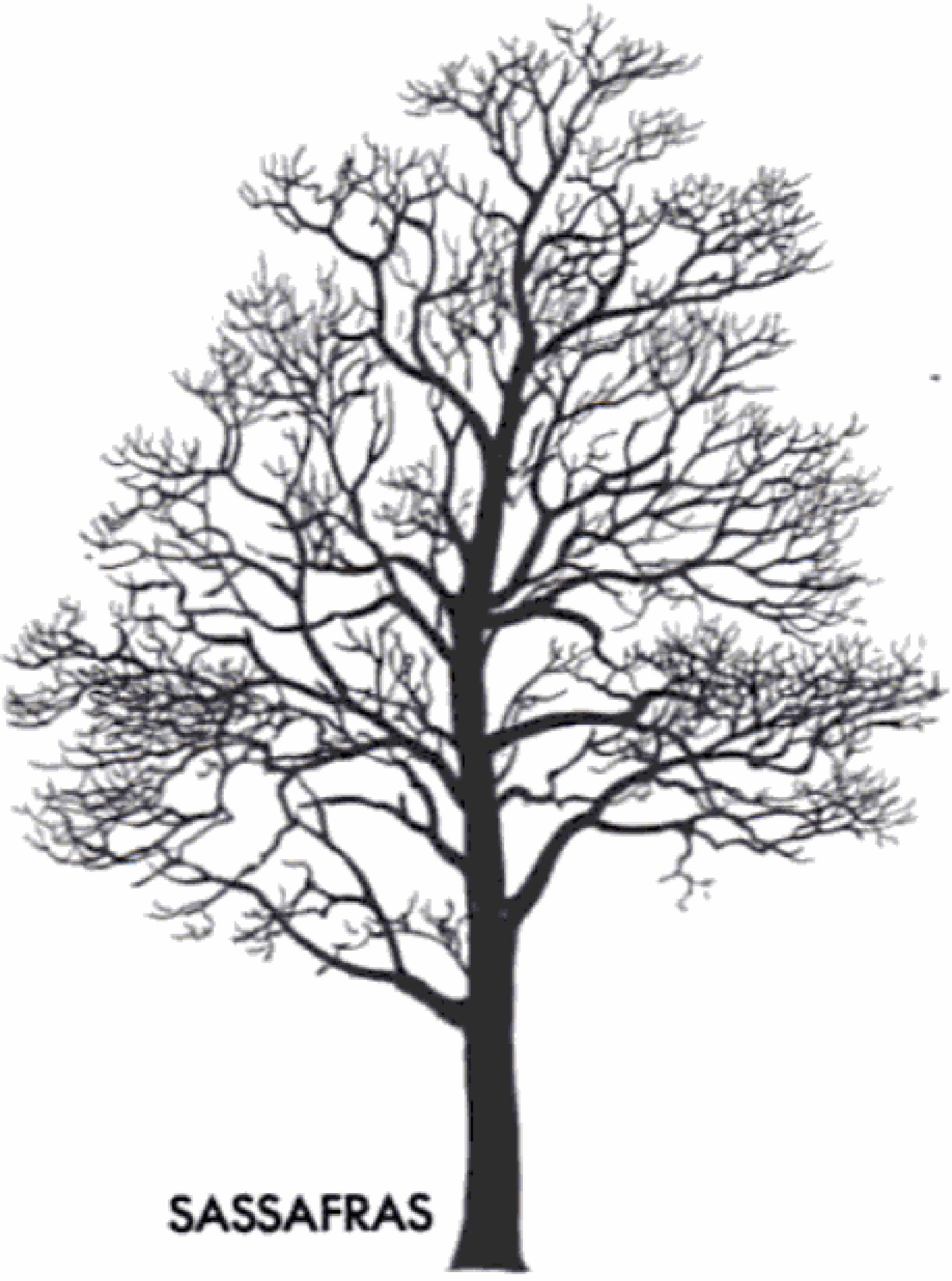
TREE-OF-HEAVEN

Flat-topped; branches without sprays; clusters of winged seeds



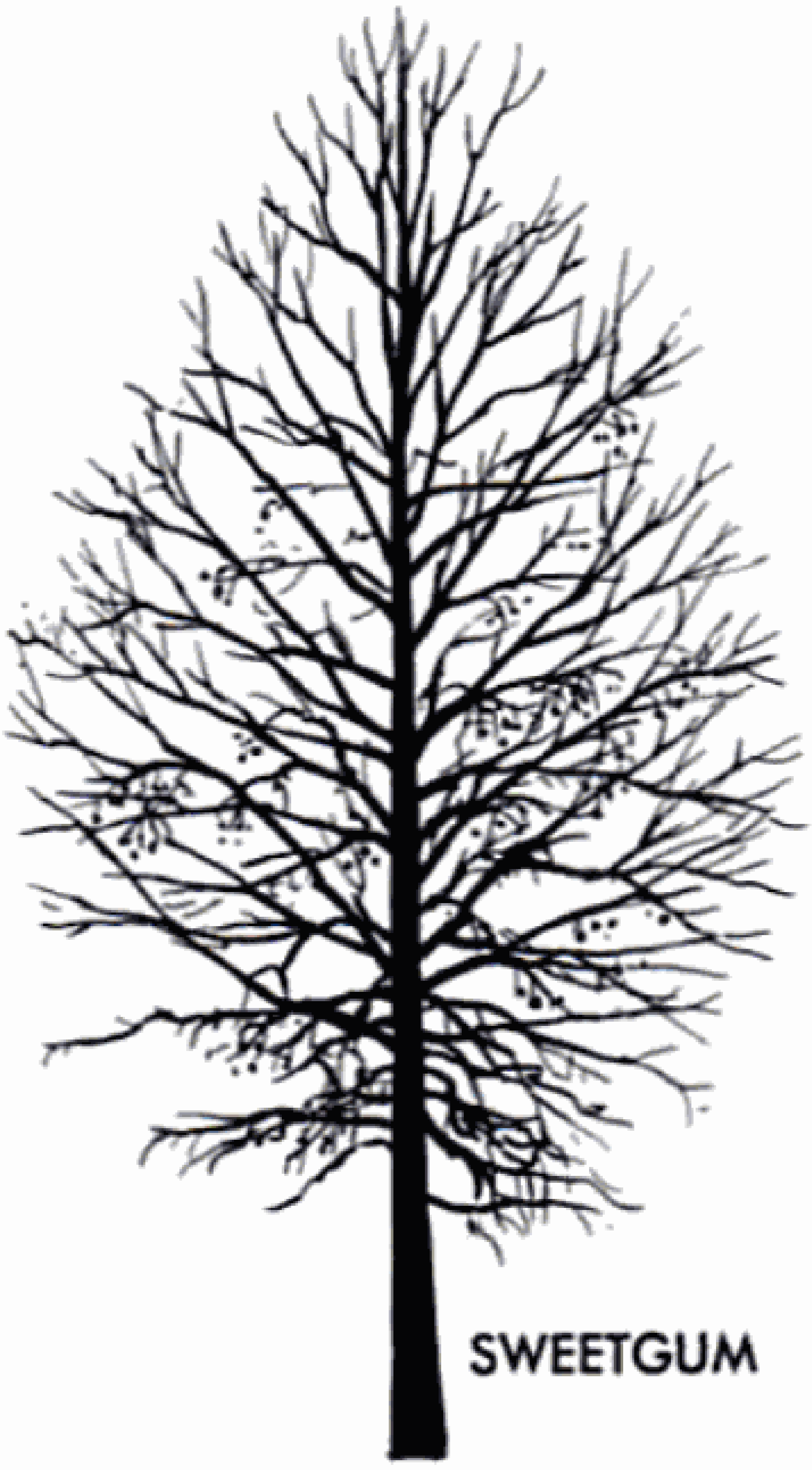
STAGHORN SUMAC

Small, straggling, forked, flat-topped; erect red fruit clusters



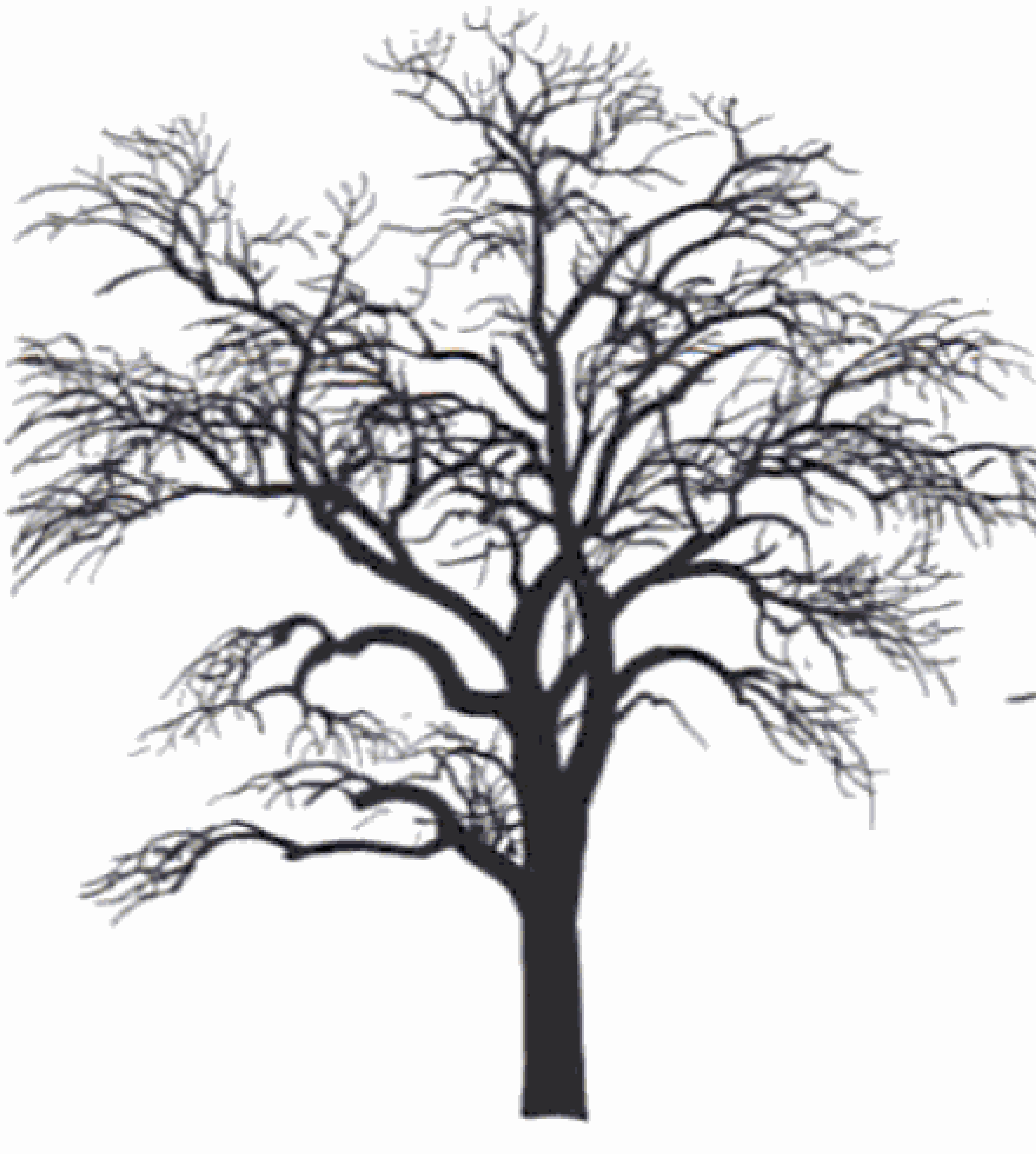
SASSAFRAS

Oblong or flat-topped head; side branches at right angles, contorted, ending in bushy spray



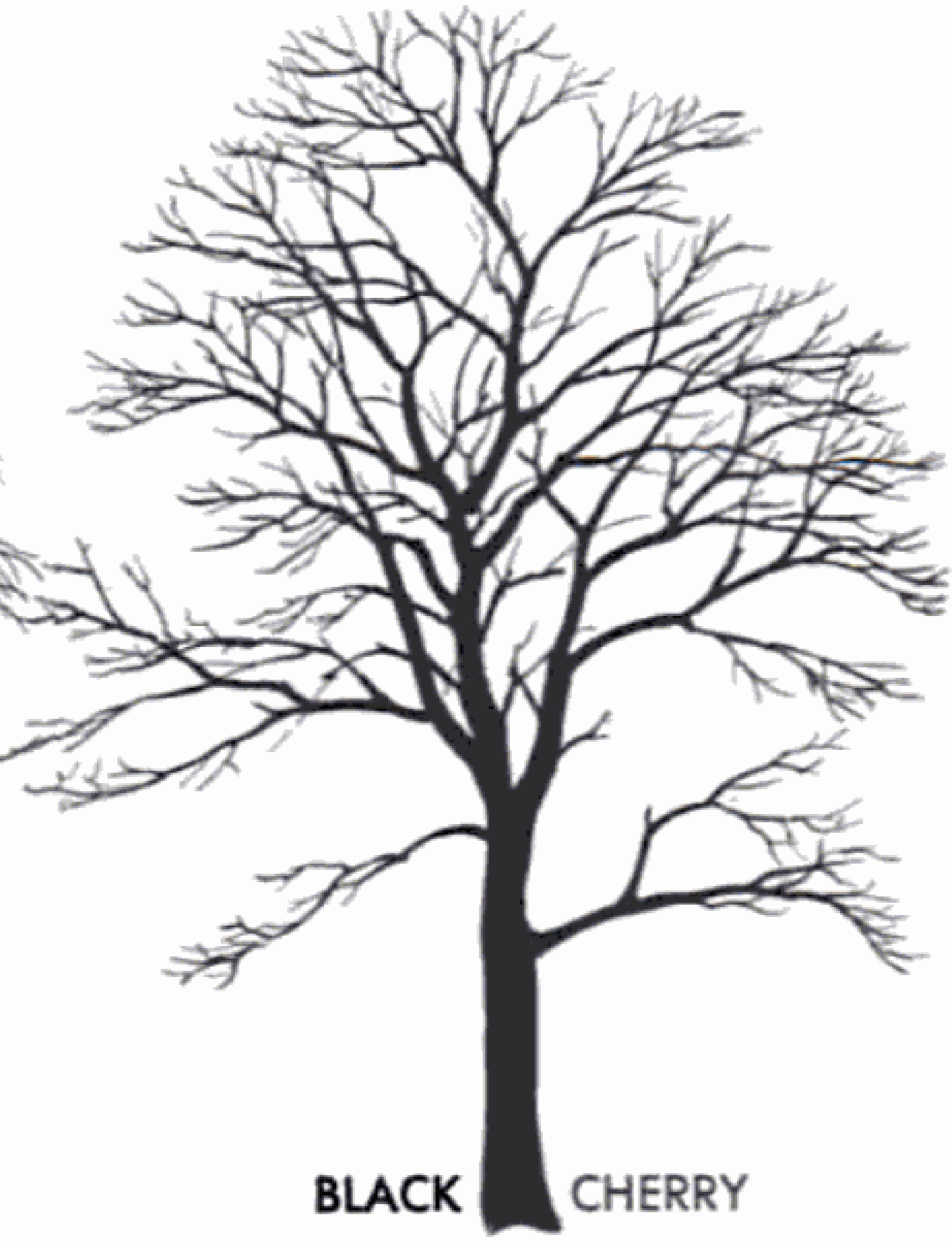
SWEETGUM

Symmetrical; conical or flat-topped; twigs with corky wings; hanging seedballs



OSAGE-ORANGE

Low ragged crown; gnarled, thorny; often in hedges



BLACK CHERRY

Oblong head; branches irregular spreading, often zigzag

SECTION I

Plants with Needlelike or Scalelike Leaves; Mostly Evergreens

THE CONE-BEARING plants and a few evergreen nonconiferous plants with narrow pointed leaves make up this well-defined group.

For the most part, these needle-bearing plants are conifers of the pine family. Exceptions are: related yews and junipers with peculiar berrylike fruits; a miscellaneous group of flowering plants whose showy blossoms often contrast with their needle- or scalelike leaves. Leaves of the last group are not indicative of relationship to the more primitive cone-producing clan.

Though most needle-leaved plants carry evergreen leaves throughout the year, needles are continually dropping and being replaced by new springtime growth. Exceptions are the larches and the Baldcypress, cone-bearers that shed their needles annually. The term evergreen also is often applied to those broad-leaved plants, such as some hollies and rhododendrons, which retain green foliage throughout the year.

A number of needle-bearing species that normally are trees in size and form become dwarfed and sprawling at timberline and in other situations exposed to extreme cold or wind.

Identify unknown plants in this Section by looking through Plates 1–6 (pp. 34–45), or by first tracing down a definite plate number according to the guide below. The few nonevergreen species also are included in the Winter Key in Appendix B.

	Name	*Plate*
1. Erect trees and shrubs, usually neither creeping nor forming mats; seeds borne in woody cones (yews have red and junipers have bluish berries):		
2. Leaves long, needlelike:		
3. Needles occurring in bundles or groups along the twigs	**PINES, LARCHES**	1, 2
3. Needles occurring singly:		
4. Needles blunt, flat	**FIRS, etc.**	3
4. Needles sharp:		
5. Needles more or less 4-sided, neither in opposing pairs nor in whorls of 3	**SPRUCES**	4
5. Needles 3-sided, either in opposing pairs or in whorls of 3	**JUNIPERS**	5
5. Needles thornlike	**GORSE**	6

Name *Plate*

2. Leaves very small and scalelike, hugging the twigs:
   6. Leaves blunt; conifers **WHITE CEDARS, JUNIPERS** 5
   6. Leaves sharp; a flowering tree **TAMARISK** 6

1. Plants creeping or forming low mats over the ground (in much exposed locations or mountains and in the Far North, see also White Pine (Plate 1), Red Pine (Plate 2), Balsam Fir, Eastern Hemlock, and Yew (Plate 3), Black and White Spruces (Plate 4):
   7. Nonflowering plants, seeds borne in woody cones or hard bluish berries; at least some needles either small and scalelike, hugging twigs tightly, or strongly whitened **WHITE CEDARS, JUNIPERS** 5
   7. Flowering plants, fruits not cones; needles various **NON-CONE-BEARERS** 6

Conifers with Needles in Clusters (1): Pines

(*Plates 1 and 2, pp. 34, 36*)

The pines are cone-bearing evergreen trees with slender needles occurring in groups of 2 to 5 along the twigs. The needle groups are bound in bundles at the base. Only the White Pine has 5 needles per cluster. All the remaining species, generally known as the yellow pines, have 2 or 3 needles per bundle. The cones described are the mature woody female cones. Male cones are small pollen-producing organs that are obvious only during the early flowering period. Female cones usually take two years to mature. If not present on the tree, frequently old ones can be found on the ground nearby. The mature bark of the White Pine is dark and furrowed but that of other pines usually is divided into more or less rectangular plates. Pine branches usually occur in whorls about the trunks; normally 1 whorl is added each year. Only a few pine species occur in any one state; they are more numerous to the south and east. The distribution limits often will assist in identification.

The pines are probably the most important timber trees in the world. Growing principally on dry, sandy soils of little value, they yield not only lumber, but also turpentine, tar, pitch, and a medicinal oil. In Germany and Sweden pine needles are treated to remove the resin and loosen the fibers and are made into "forest wool." This material is used to stuff cushions and mattresses, and blankets and garments woven of it are said to be warm and durable. Several western pines produce edible seeds; those of the pinyon pines (*Pinus edulis* and *P. monophylla*) of the Great Basin region are especially delicious. Seeds of many species rank high among the foods of nearly all game birds, rabbits, hares, squirrels, and chipmunks, and are also eaten by coyote and black bear. The twigs and needles serve as food for deer, moose, and other browsing animals, but mostly under near-starvation conditions.

WHITE PINE *Pinus strobus* L. **pp.** 2, **34**

Recognition: A tall tree with relatively few and horizontal large limbs. Needles 2″–4″ long, slender, and occurring *5 to the bundle.* Cones slender; tapering, thornless, 3″–10″ long. Bark not scaly as in other pines but dark with deep furrows. A dwarf matted form occurs in windswept northern areas. Height 80′–110′; diameter 2′–3′ (6′).

Similar species: This is our only 5-needled pine.

Remarks: One of the most important and tallest timber trees in Northeast. So extensively lumbered that few virgin trees, which once grew to heights of 200′ to 220′, remain. In some areas reforestation is considerable. Wood light, soft, straight-grained, and generally not as resinous as in other pines; of great value for house construction. Plagued by white pine blister rust, a fungus attacking the inner bark, and white pine weevil, an insect that kills the topmost shoot, deforming the tree and limiting its value. The rust can be controlled by removal of currants and gooseberries (Plates 40 and 41) — upon which the fungus spends a portion of its life cycle — from within a quarter-mile of the pines.

PITCH PINE *Pinus rigida* Mill. **pp.** 2, **34**

Recognition: A medium-sized tree with needles 1½″–5″ long, *3 per cluster.* Needles coarse, stiff, *mostly twisted,* ¹⁄₁₆″ or more wide. Needle sheaths ⅛″–⅝″ long. Cones stout, 1″–3″ long, often remaining long on tree; scales tipped with thorns up to ⅛″ long. Height 40′–60′ (70′); diameter 1′–2′ (3′).

Similar species: When (1) Shortleaf or (2) Mountain Pines have needles in 3's the Shortleaf may be identified by whitened twigs, slender untwisted needles, and weak cone prickles and Mountain by the shorter needles and cone prickles over ⅛″ long.

SWAMP PINE *Pinus serotina* Michx. f. **p. 34**

Recognition: Similar to Pitch Pine but needles 5″–11″ long. Needle sheaths ⅜″–1″ long. Cones 2″–2½″, opening late, and with prickles weak or absent. Height to 80′; diameter to 2′.

LOBLOLLY PINE *Pinus taeda* L. **pp.** 2, **34**
Recognition: A tall *southern* tree with needles 5″–10″ long and 3, or sometimes 2, needles per cluster. Needles less than 1⁄16″ across. Cones stout, more or less cylindrical, 2½″–5″ long; scales mostly under ½″ wide, and when caught by hand the thorn-tipped scales hurt. Height 80′-100′ (115′); diameter 1′–2′ (5′).
Similar species: (1) Pitch Pine has much shorter needles and cones; (2) Longleaf Pine, longer needles and cones, much stouter twigs. (3) Swamp Pine has coarser needles and shorter, less thorny cones. (4) Shortleaf Pine may have some needles in 3's but needles shorter, prickles over 1⁄8″ long. (5) Red Pine occurs northward.
Remarks: An important lumber tree. Invades old fields.

LONGLEAF PINE *Pinus australis* Michx. f. **p. 34**
Recognition: A beautiful straight *southern* tree with *very long needles* grouped in 3's. Needles 8″–18″, mostly over 11″, long and less than 1⁄16″ across. Twigs *stout,* diameter ½″ or more. Cones stout, conical, 6″–10″ long; scales over ½″ wide. Thrown cones hardly prickle when caught by hand. Height 60′–70′ (85′); diameter 1′–2′ (3′ 6″).
Similar species: No other pine has such long needles.
Remarks: The most important turpentine pine and most valuable timber pine in South. Quick-growing and fire-resistant.

Plate 2
(*p. 36*)

SHORTLEAF PINE *Pinus echinata* Mill. **p. 36**
Recognition: A tall *southern* tree with 3″–5″ needles in bundles of 2's or sometimes 3's. Needles less than 1⁄16″ across, mostly straight and untwisted. Twigs *whitened* with a powdery covering. Cones 1½″–3″ long; scales tipped with a short weak prickle. Height 90′–100′ (150′); diameter 3′–4′.
Similar species: (1) Of 2-needled pines only Red Pine has needles as long, but it has pointless cone scales and occurs mostly north of this species. (2) Loblolly may have 2-clustered needles but they are longer, and cones strongly thorny. (3) When needles occur in 3's, Shortleaf Pine resembles Pitch Pine, but that tree has twisted needles, unwhitened twigs, and stoutly thorny cones.
Remarks: An important timber species.

RED PINE *Pinus resinosa* Ait. **pp.** 2, **36**
Recognition: A tall *northern* tree with 3″–8″ needles in 2's. Needles less than 1⁄16″ across. Twigs not whitened. Cones 1½″–2½″ long; scales thornless. Bark plates somewhat red-

dish. A dwarf form is rare. Height 50′–80′ (85′); diameter 1′–2′ (3′).

Similar species: Only (1) Loblolly and (2) Shortleaf Pines may have paired needles of similar length. Both are more southerly, overlapping of ranges being likely only for the Shortleaf, which is differentiated by whitened twigs and somewhat prickly cones.

Remarks: A beautiful tree widely used in reforestation. Often called Norway Pine, but native only to N. America.

JACK PINE *Pinus banksiana* Lamb. **p. 36**

Recognition: A scrubby small or medium-sized *northern* tree with *very short 2-needled* clusters. Needles only ¾″–1⅝″ long and more than 1/16″ across. Cones usually curved or bulging on one side, 1¼″–2″ long; scales either thornless or with tiny weak prickles. Height 15′–40′; diameter 9″–15″.

Similar species: No other pine in our area has such short needles or curved cones.

Remarks: Produces poor timber, but widespread in some northern areas that otherwise would support no tree growth.

SCRUB PINE *Pinus virginiana* Mill. **p. 36**

Recognition: A mostly small or medium-sized southern tree with 1½″–3″ needles in 2's. Needles 1/16″ or less across. Twigs yellowish or somewhat purplish and *whitened.* Cones somewhat egg-shaped, 1½″–2½″, numerous, remaining on tree for many years; scales tipped by 1/16″–⅛″ thorns. Height 30′–40′ (60′); diameter 1′–2′ (3′).

Similar species: (1) Scotch and (2) Mountain Pines have needles of this length in 2's but twigs are not whitened. (3) Cones of Scotch Pine are thornless, whereas those of (4) Mountain Pine have sharp thorns of 3/16″ or more. Scotch Pine spreads from plantings mostly north of Scrub Pine ranges.

SCOTCH PINE *Pinus sylvestris* L. **p. 36**

Recognition: A medium-sized to tall northern tree with 1½″–3″ needles in 2's. Needles up to 1/16″ across. Twigs only slightly or not whitened. Cones 1¼″–2½″; scales with raised more or less sharp point but actually thornless. Higher trunk and branches *bright orange color.* Height 60′–90′; diameter 1′–2′.

Similiar species: (1) Scrub Pine has whitened twigs and thorny cones. (2) Mountain Pine has coarser needles and heavy, long-thorny cones. Neither of these species has the upper bark bright orange.

Remarks: Imported from Europe for forest and Christmas tree plantings.

MOUNTAIN PINE *Pinus pungens* Lamb. **p. 36**

Recognition: A small to medium-sized tree with 1½″–3″ needles in 2's or, less commonly, in 3's. Needles usually 1/16″

or more across. Twigs not whitened. Cones 2″–3½″ long, unusually heavy, woody, opening late; scales tipped by *exceptionally long thorns*, over 3⁄16″. Height to 60′; diameter to 2′. **Similar species:** Cones are distinctive and limited range is helpful. Pitch Pine has longer needles, in 3's and shorter cone thorns. See under Scrub and Scotch Pines.

Conifers with Needles in Clusters (2): Larches

(*Plate 2 contd., p. 36*)

The larches and Baldcypress (Plate 3) are our only conifers that *drop their leaves* in autumn, leaving conspicuous *warty "spurs"* on the twigs. Needles are clustered at the ends of these spurs. Leaf scars have 1 bundle scar. Cones have relatively few scales, thinner than in pines. Larches are frequently called tamaracks.

AMERICAN LARCH (TAMARACK) **pp.** 5, **36**
Larix laricina (Du Roi) K. Koch.

Recognition: A medium-sized to large pointed-top tree with slender needles ⅜″–1″ long, on short spurs; needles *many on short spurs*. On longer shoots needles are single. Branchlets not drooping. Cones ½″–13⁄16″ long. Trunk bark dark, flakes off in small scales. An uncommon form is low, with branches flattened on ground. Height 40′–80′ (90′); diameter 1′–2′ (3′).

Similar species: (1) European Larch has longer needles and cones, drooping branchlets, and bark with large plates. (2) Baldcypress is southern, and flat needles not clustered.

Remarks: An important northern timber tree (poles, posts, railroad ties). Seeds, needles, or inner bark eaten by ruffed and sharptail grouse, snowshoe hare, red squirrel, porcupine, and deer.

EUROPEAN LARCH *Larix decidua* Mill. **p. 36**

Recognition: This European form sometimes spreads from plantings. Needles 1″–1¼″ long; branchlets may droop. Cones 13⁄16″–1⅜″ in length. Red-brown trunk bark divided into large plates. This is more of an upland species.

Conifers with Flat Needles

(*Plate 3, p. 38*)

Unlike the pines and spruces, this is a group that for the most part is not closely related. They are alike in having flat needles arranged on the twigs in flat foliage sprays. Plants with flat needles which are low or creeping also should be compared with the plants of Plate 6.

BALSAM FIR *Abies balsamea* (L.) Mill. **pp.** *4,* **38**
Recognition: A steeple-shaped evergreen tree with needles ⅜″–1¼″ long and *whitened beneath.* Needles have a *broad circular base;* twigs rather *smooth* after needles are removed. Cones 1″–3″ long, *upright and fleshy,* falling apart upon ripening and often leaving erect slender central cores. They are purplish to green, no bracts visible between scales. The plant may grow as a low matlike shrub at timberline. Bark rather smooth, with resin blisters. Height 40′–60′ (75′); diameter 1′–2′ (3′).
Similar species: Upright cones distinctive when present. Hemlocks have stalked needles and rough twigs. (1) American Yew is shrubby and has smooth twigs. (2) See also Fraser Fir.
Remarks: A good Christmas tree that holds its needles. Soft, perishable wood of less value than spruce as lumber or pulp. Canada balsam is obtained from bark blisters, a gum used by woodsmen as a wound plaster and waterproof cement; sold in stores as a confection before advent of chicle chewing gum. Formerly used in cementing lenses and in mounting specimens on microscope slides. Fire-by-friction sets are often made of this wood, and resinous fir knots once were used as torches. Seeds are eaten by ruffed, spruce, and sharptail grouse; twigs eaten by snowshoe hare, whitetail deer, and moose; bark gnawed by porcupine.

FRASER FIR *Abies fraseri* (Pursh) Poir. **Not illus.**
Recognition: Differs from Balsam Fir in cone scale structure and distribution. Cones adorned with bracts whose 3-parted tips *project obviously* from between the scales. Foliage occurs less frequently in flattened sprays. Mostly above 4000′ altitude in mountains of sw. Virginia, w. N. Carolina, and e. Tennessee.

EASTERN HEMLOCK *Tsuga canadensis* (L.) Carr. **pp.** *4,* **38**
Recognition: Frequently a more round-topped tree than the spruces or firs. Twigs and branchlets more flexible than in those groups; they "ride with the wind." Needles ⁵⁄₁₆″–⁹⁄₁₆″ long, *whitened* beneath, attached to the twigs *by slender stalks.* Twigs *rough* when leaves are removed. Cones only ⅝″–1″ long, brown, few-scaled, pendent. A matlike form occurs in exposed places in n. New England and e. Canada. Bark dark and rough. Height 60′–70′ (100′); diameter 2′–3′ (6′).
Similar species: Firs have circular needle bases, smooth twigs.
Remarks: The delicate silvery foliage and small, pendent, perfectly formed brown cones of the hemlock make this one of

our most beautiful forest trees. The fact that the leaves fall upon drying makes it a poor Christmas tree. Formerly spared the ax because of poor quality of wood and stonelike hardness of the knots, which will chip steel blades, but the dearth of timber and tanbark has recently doomed most virgin stands. Lumber taken for pulp but particularly useful for railroad ties, since it holds spikes exceptionally well. Bark rich in tannin; a tea was once made from leaves and twigs by woodsmen and Indians. As fuel, the wood throws sparks. Seeds and needles eaten by ruffed and sharptail grouse; twigs browsed by deer, red squirrel, snowshoe hare, and cottontail rabbit.

CAROLINA HEMLOCK **Not illus.**
Tsuga caroliniana Engelm.

Recognition: Like Eastern Hemlock but with needles ⅝″–¾″ long and cones ¾″-1⅜″ long. Occurs in mountains from w. Virginia to w. S. Carolina, n. Georgia, and e. Tennessee.

AMERICAN YEW *Taxus canadensis* Marsh. **p. 38**

Recognition: An evergreen shrub with needles ⅜″–1″ long, pointed, *green on both sides.* Needles stalked, stalks following down twig for a distance below needle. Twigs *smooth.* On female plants, fruits juicy, red, *berrylike,* about ½″ in diameter, single hard seeds visible from beneath. Height to 3′ (6′).

Similar species: No other plants have such fruits. (1) See Balsam Fir. (2) The very low Mountain-heath (Plate 6) or flattened forms of firs or hemlocks might occasionally be confusing, but Mountain-heath has short blunt needles and firs and hemlocks blunt whitened needles.

Remarks: Despite reports that twigs, foliage, and seeds may be poisonous to livestock, the berries are eaten by birds and foliage is a preferred food of deer and moose. Wood is hard, close-grained, and strong. Before the advent of firearms the European species was used in manufacture of bows; the name *Taxus* is from the ancient Greek word meaning bow.

BALDCYPRESS *Taxodium distichum* (L.) Richard. **pp. 5, 38**

Recognition: A majestic *non*evergreen tall tree of *southern swamps.* Needles ¼″–⅞″ long, green on both sides, mostly flat but sometimes somewhat 3-sided; clustered along slender greenish twigs. Needles and most twigs *drop in winter,* leaving branchlets roughened by small few-scaled buds. Leaf scars lacking but areas similar to leaf scars present although without bundle scars. Bark brown and rather smooth but fibrous, and trunk base often deeply ridged. In deep water, *peculiar root growths* called "knees" come upward to surface. Cones *ball-shaped,* about 1″ in diameter, with thick scales. Height 80′–120′ (140′); diameter 3′–4′ (20′).

Similar species: Larches (northern), the only other nonevergreen conifers, have needles in clusters and single bundle scars.
Remarks: Once seen, a mature stand of this majestic relative of the Redwood is not soon forgotten. One of the most valuable lumber trees; used for construction work, railroad ties, posts, shingles. Wood is soft, light, straight-grained, very durable, and does not warp easily. Only distantly related to true cypresses such as famed Monterey Cypress of California. Seeds eaten by cranes and some songbirds. Grows on uplands if planted.

Conifers with 4-sided Needles: Spruces

(*Plate 4, p. 40*)

Spruces are ornamental, sharply steeple-shaped evergreen trees of cold climates whose needlelike leaves are somewhat 4-angled, short, stiff, and sharp. They tend to grow all around the twigs. When these needles are removed, the twigs and branchlets remain rough from the persistent needle bases. Like firs and yews, spruce branchlets are tipped with twigs arranged in the shape of Christian crosses. Spruce cones are brown and woody when mature and, unlike the firs, are not erect and do not fall apart on the tree. Their scales are thin, not heavy or thorny as in the pines. The bark is rough and dark.

Spruces grow north to the limit of trees, forests thinning down to dwarf specimens extending far into the tundra. One species persists on mountaintops as far south as Georgia. Low matted specimens should be compared with the plants of Plate 6.

Spruces often are used as Christmas trees, but their needles fall quickly upon drying out. The wood is soft, light, resinous, and straight-grained. It provides a principal source of pulp for paper and is valuable for sounding boards in pianos and in construction work, interior finishing, and boatbuilding. Tannin and "burgundy pitch," used in varnishes and medicinal compounds, come from the bark of certain species. In Europe some spruces are tapped for turpentine, and in times of food shortage the inner bark has been ground and added to flour. Spruce beer, it is reported, is made from the fermented leaves and twigs of Red or Black Spruces after being boiled with honey. Several spruces are of great value in landscaping. Their immaculate appearance doubtless provides the basis for the term "spruced."

RED SPRUCE *Picea rubens* Sarg. **pp.** *3*, **40**
Recognition: Twigs and buds typically *hairy;* needles *dark or yellow-green,* ½″–⅝″ long and often curved upward. Cones

1¼″–1⅝″ long, more or less reddish brown with scale edges smooth. They fall soon after maturity. Height 60′–70′ (75′); diameter 1′–2′ (3′).
Similar species: Black Spruce has shorter needles and cones; occurs on moist sites.

BLACK SPRUCE *Picea mariana* (Mill.) BSP. **pp.** 3, **40**
Recognition: Twigs and buds *hairy.* Needles *short.* Needles mostly ¼″–7⁄16″ long, sometimes blue-green with a white powder. Cones only ¾″–1¼″ long, somewhat gray-brown, with scale edges rather ragged. Cones usually remain on tree for several years. Low matlike forms are known from northern mountains, especially where exposed to severe winds and cold. Height 25′–30′; diameter 1′–2′.
Similar species: (1) Red and (2) White Spruces have longer needles and cones and occur mostly on uplands. White Spruce has hairless twigs.

NORWAY SPRUCE *Picea abies* (L.) Karst. **pp.** 3, **40**
Recognition: Twigs are *hairless* or nearly so. Needles *dark green,* mostly ½″–1″ long. The twigs and *branchlets hang downward.* Cones *4″–6″ long,* falling soon after maturing; scales stiff. Height 60′–90′; diameter 1′–3′.
Similar species: Only spruce in our area with drooping branchlets and only one with large cones.

WHITE SPRUCE *Picea glauca* (Moench) Voss **pp.** 3, **40**
Recognition: Twigs and buds are *hairless;* needles *blue-green,* ⅜″–¾″ long. Branchlets do not droop. Cones 1″–2″ long; scales flexible, dropping soon after maturing. In Far North and on high mountains a low matlike form occurs in exposed locations. Height 50′–60′; diameter 1′–2′.
Similar species: Black Spruce has shorter needles, hairy twigs, and occurs more abundantly in swamps.

Conifers with Scalelike or 3-sided Leaves

(*Plate 5, p. 42*)

Differing from all other cone-bearing trees, these related species possess very small, peculiarly flattened leaves that form scaly coverings for at least some twigs. *Juniperus* fruits, though technically similar to cones, are berrylike.

The white cedars possess only scalelike, flattened needles; the junipers (including the Red Cedar) may bear either scaly or hollowed 3-sided needles, or both. Occasionally, some leaves of the Baldcypress are 3-sided rather than flat but they are more fernlike and not whitened (see Plate 3).

The 3-sided type of leaf is only approximately triangular in cross section, but is easily recognized by the concave whitish inside surface. These needles may occur in pairs of 3's but are never bound at the base in bundles as are pine and larch needles. It may be necessary to use a magnifying glass to determine arrangements of scaly leaves, but usually more easily determined characteristics are available. Seedlings may be impossible to identify. The fruiting structures are quite diverse (see p. 42).

Although several of these are popularly known as cedars, only members of the Old World genus *Cedrus*, including the cedars of Lebanon, N. Africa, and the Himalayas, are true cedars. They may be seen in this country only where planted for decorative purposes. True cedars have larchlike clusters of needles that remain evergreen.

NORTHERN WHITE CEDAR (ARBOR VITAE) pp. *4*, 42

Thuja occidentalis L.

Recognition: A medium-sized tree with leaves nearly all scalelike and 1/16″–1/8″ long. They occur in 4 rows around twigs but are flattened from the sides. Central leaves show tiny glands. Twigs and leaves occur *in flattened sprays* that typically are aligned vertically. Heartwood light-colored. Cones more or less bell-shaped, about ½″ long. A prostrate, carpetlike form occurs in Quebec. Bark is fibrous with numerous cross-thatched ridges. Height 40′–50′ (125′); diameter 2′–3′ (5′).

Similar species: (1) Atlantic White Cedar has different range, less flattened leaves and leaf sprays, globular cones. (2) See Tamarisk (p. 28).

Remarks: An earlier, widely used name is Arbor Vitae, a latinized French name meaning "tree-of-life." It was so named after it cured the men of Jacques Cartier's Canadian expedition of a disease, probably scurvy. The incident resulted in this being the first tree to be imported from America into Europe. Over 50 varieties now in cultivation. Known also as Canoe-wood, it was used by the Indians. Thin slabs of the wood were prepared by pounding the ends of short logs until they separated along the annual rings. Wood is soft, light-colored, durable, and used for shingles and fire-by-friction sets. Outer bark supplies tinder. Cedar swamps provide favorite winter quarters and food for deer. Moose, snowshoe hares, and cottontail rabbits also eat the twigs and foliage; red squirrels and many songbirds consume the seeds.

ATLANTIC WHITE CEDAR p. 42

Chamaecyparis thyoides (L.) BSP.

Recognition: Similar to Northern White Cedar but with the

scalelike leaves *narrower*, less distinct, and not so much flattened on the twigs. The foliage sprays not flattened. Cones *globular*, ¼″–½″ in diameter. Height 40′–60′; diameter 1′–2′ (3′).
Similar species: See Tamarisk (p. 28).
Remarks: Both the lumber and crushed foliage are aromatic. Wood is soft, durable, very light. The lumber, used in shipbuilding, construction work, and as shingles, is of such value that large logs buried in prehistoric times have been mined in New Jersey bogs. Formerly, organ pipes were made of this resonant wood. White cedar charcoal was used in making gunpowder during American Revolution. Their beauty and resistance to insects and disease have caused a number of horticultural varieties of this tree and its oriental relatives to be used in landscaping. A native species also known as Arbor Vitae. It is browsed by deer.

DWARF JUNIPER *Juniperus communis* L. **p. 42**
Recognition: A tree, or more commonly a shrub, with sharp, hollowed, 3-sided needles that occur in *whorls of 3*, *whitened above* and ¼″–⅞″ long. Twigs, or at least branchlets, are *3-sided*. Fruits are berries, rather hard, blue-black, with a white powder, and are ball-shaped. In our area, 3 varieties (especially var. *depressa* Pursh) of low, creeping, mat-forming habit are more widespread than the upright form. Height 1′–4′ (35′); diameter 1″–6″ (1′).
Similar species: Only juniper with needles in 3's and strongly whitened. (1) Trailing Juniper has paired green needles. (2) Heather (Plate 6) has 4-sided leafy twigs. (3) Tamarisk (p. 28) is taller, with flowers and fruit capsules.
Remarks: Oil from leaves and wood is used in perfumery, and the aromatic foliage is burned as an incense in India. The plant supplies food for ruffed and sharptail grouse, bobwhite, "Hungarian" partridge, pheasant, whitetail deer, moose, and smaller birds and mammals.

RED CEDAR *Juniperus virginiana* L. **pp.** *4*, **42**
Recognition: A medium-sized tree usually with both scalelike and longer, sharply 3-sided, needlelike leaves. Leaves 1/16″–¾″, entirely green, in pairs in 4 rows along *4-sided twigs* and branchlets. Heartwood reddish. Fruits more or less *globular*, hard, whitish- to blackish-green berries about ¼″ in diameter, 1–2 seeds. Bark dry, shreddy, not ridged. Rarely — in windswept locations — shrubby and creeping. Height 40′–50′ (62′); diameter 1′–2′ (4′).
Similar species: (1) Mexican Juniper has no central trunk and barely enters our area. (2) Tamarisk (p. 28) has alternate needles, as well as flowers and fruit capsules.
Remarks: Birds pass the seeds through their digestive tracts

undamaged, dropping them particularly along fences. The Red Cedar acts as alternate host to the apple rust. During half its life cycle this fungus spots apples and their leaves; during the other half, it forms ball-shaped brown galls on cedar twigs. After heavy rains these galls extrude numerous hanging brown gelatinous threads. Do not confuse with cedar fruits, which are hard but berrylike.

Heartwood is aromatic and of rose-brown color. It is light, strong, durable, and widely used for cedar chests, cabinets, lead pencils, fuel, and fence posts. The dry outer bark, when stripped and rubbed between the hands, provides excellent tinder and is used in flint-and-steel and sunglass fire sets. A volatile oil derived from juniper leaves is used in perfumes and a flavoring may be derived from the berries. The fruits are consumed by well over 50 species of birds, including bobwhite, sharptail grouse, pheasant, and mourning dove, and also by opossum.

MEXICAN JUNIPER **Not illus.**
Juniperus mexicana Spreng.

Recognition: A round-topped shrub or tree that, unlike other upright junipers, has *no central trunk.* Unlike Red Cedar and Trailing Juniper, the seeds (not fruits) are over 3/16″ long. There is usually 1 seed per fruit, but there may be 2–3. Sw. Missouri and w. Texas westward.

TRAILING JUNIPER **p. 42**
Juniperus horizontalis Moench

Recognition: Like the preceding 2 species in needle arrangement but more northerly and *prostrate,* mat-forming, and often trailing. Fruits may be up to 3/8″ in diameter, containing 3–5 seeds. Foliage or fruits eaten by sharptail grouse, whitetail deer, and moose. Dwarf Juniper has whitened needles in whorls of 3. Heather (Plate 6) has 4-sided, rather leafy twigs. Tamarisk (p. 28) is taller, with flowers and fruit capsules.

Needle-bearing, Non-Cone-bearing Evergreens

(*Plate 6, p. 44*)

In addition to the cone-bearers, a few flowering plants have needlelike and sometimes also scalelike leaves. Nearly all such plants have colorful blossoms. In general, they are creeping in habit, forming dense, matted, sometimes mosslike, growths.

Tamarisk, however, is an erect shrub or tree and Gorse is an upright shrub. Dwarf Mistletoe is parasitic on conifer branches. Of the plants discussed in the following accounts only Tamarisk, Heather, and Mountain-heath conceivably might be confused with any other members of the needle-bearing group. Alpine-azalea and Sandmyrtle, whose small opposite leaves are too broad to be considered needlelike, are shown on Plates 12 and 17. Some plants of this plate are of value in the control of soil erosion or in the anchoring of dunes.

Nearly all the conifers that grow in the Far North and on high mountains may grow in a dwarf or matted manner in exposed locations. This is true of White and Red Pines (Plates 1 and 2), Balsam Fir, Eastern Hemlock, and American Yew (Plate 3). Black and White Spruces (Plate 4), Northern White Cedar, Red Cedar, and Dwarf and Trailing Junipers (Plate 5). When identifications are attempted in such locations, the accounts of those conifers also should be consulted.

DOWNY HUDSONIA *Hudsonia ericoides* L. **p. 44**

Recognition: A *mosslike* shrub with the needlelike leaves somewhat hairy but greenish, spreading, sharp, and 1⁄8″–3⁄16″ long. Older bark flaking. Flowers small, clustered, yellow, or rarely white, May–June. Fruits small, dry, 1-parted capsules.

Similar species: (1) Woolly Hudsonia also hairy but has shorter and more matted-hairy needlelike leaves. (2) Purple Crowberry has fleshy fruits and blunt-tipped leaves.

WOOLLY HUDSONIA *Hudsonia tomentosa* Nutt. **p. 44**

Recognition: Similar to preceding species but with 1⁄16″–1⁄8″ needles enmeshed in *thick whitish hair* and hugging the twigs. A form intermediate between the two species may be a hybrid.

TAMARISK *Tamarix gallica* L. **Not illus.**

Recognition: An importation from Eurasia, this upright shrub or tree is becoming established in the Northeast. In some localities called Salt-cedar. Pale green leaves less than 1⁄16″ long, scalelike, on long, slender, often drooping twigs. Numerous slender spikes of pink, or sometimes whitish, flowers usually present from May to Sept. Fruits small dry capsules. Roadsides and thickets; Massachusetts, Indiana, and Kansas to Florida, s. Texas, and s. California.

HEATHER *Calluna vulgaris* (L.) Hull **p. 44**

Recognition: A low *fernlike* shrub with *sharp* green needles 1⁄32″–1⁄16″ long, crowded in 4 rows along twigs. Bare portions of twigs or branchlets evident. Older bark smooth. Height 5″–15″. Flowers small, clustered, pink, or less commonly white, July–Nov. Fruits small, dry, 4-parted capsules.

Similar species: The junipers are low and bushy but do not have needles in 4 dense rows.

CASSIOPE *Cassiope hypnoides* (L.) D. Don **p. 44**
Recognition: A tufted *mosslike* creeping shrub with *blunt* green needles 1⁄16″–3⁄16″ long, crowded in 4 rows along twigs. Bare portions of twigs or branchlets usually hidden on upright portions of plant. Older outer bark smooth. Height 1″–5″. Flowers small, single, pink or white, on long stalks, June–Aug. Fruits small, dry, 4- to 5-parted capsules.

CROSSLEAF HEATH *Erica tetralix* L. **Not illus.**
Recognition: Like Cassiope, a creeping shrub with needles 1⁄16″–3⁄16″ long in 4 rows on twigs. Leaves less densely crowded, with *knob-tipped hairs* visible to the eye and readily apparent under hand lens. Bare portions of twigs readily evident. Height to 10″–12″. Flowers small, pink, vase-shaped, clustered at twig tips, July–Oct. Fruits small, dry, 4-parted capsules. European plant established in acid soils; scattered localities in Maine, e. Massachusetts, and W. Virginia.

CORNISH HEATH *Erica vagans* L. **Not illus.**
Recognition: Similar to Crossleaf Heath but with needles *hairless,* in 3's and 4's. Flowers occur in side rather than end clusters. Established locally on Nantucket I., Massachusetts.

SCOTCH HEATH *Erica cinerea* L. **Not illus.**
Recognition: A low creeping shrub with needles 1⁄8″–1⁄4″ long *in whorls of 3* with numerous additional and smaller needles clustered in the angles of longer needles; not hairy. Flowers vase-shaped, purple, at twig tips or in side clusters, July–Oct. Fruits small, dry, 4-parted capsules. A European introduction established locally on Nantucket I., Massachusetts.

BROOM-CROWBERRY *Corema conradii* Torr. **p. 44**
Recognition: A spreading low shrub with very narrow green needles 1⁄8″–3⁄16″ long. Leaves may be in 4's but are staggered on twigs to form 8 rows or a scattered pattern. Older bark flaky. Height 6″–24″. Flowers without petals; male blossoms purplish, in heads at ends of twigs, March–May. Fruits small, rather *dry* brown berries with 3, or less commonly 4–5, seeds, July–Aug.
Similar species: True crowberries are lower, have wider needles, scattered flowers, and juicy fruits with more numerous seeds.

BLACK CROWBERRY *Empetrum nigrum* L. **p. 44**
Recognition: A ground-hugging, spreading shrub with narrow or somewhat elliptic, sharp-tipped, green needles 1⁄8″–1⁄4″ long.

Leaves dense, not regularly in 4 rows. Twigs hairless or somewhat long-hairy. Older bark flaky. Height 2″–3″. Flowers without petals, scattered, June–July. Fruits pea-sized, *juicy*, black, rarely white, with 6–9 seeds, July–Nov. or longer. **Similar species:** (1) Purple and (2) Rock Crowberries have hairy leaves. (3) See also Broom-crowberry. **Remarks:** Over 40 birds, including ruffed grouse and ptarmigan, are known to eat the fruits.

PURPLE CROWBERRY **Not illus.**
Empetrum atropurpureum Fern. & Wieg.

Recognition: Similar to Black Crowberry but with *white-woolly* leaves and twigs. Leaves of growing shoots blunt-tipped, 3⁄16″–1⁄4″ long. Fruits red to purple, 3⁄16″–5⁄8″ across. Rock Crowberry has shorter leaves. Downy Hudsonia has longer, sharp-tipped leaves. Sandy and rocky soils; s. Labrador and Quebec to s. Nova Scotia and n. New England.

ROCK CROWBERRY **Not illus.**
Empetrum eamesii Fern. & Wieg.

Recognition: Like Purple Crowberry but with needles of growing shoots 1⁄8″–3⁄16″ long. Fruits pink to light red, 1⁄8″–3⁄16″ across. Sandy and rocky soils; se. Labrador and Newfoundland to Nova Scotia.

DWARF MISTLETOE **Not illus.**
Arceuthobium pusillum Peck

Recognition: An *inconspicuous parasitic shrub* with tiny opposite scalelike leaves. Stems rectangular in cross section, less than 1″ long. Fruits small, dry. Only other mistletoe (p. 69) has wide, opposite, leathery leaves. This plant often causes "witches brooms" among branches of host plant, but such dense tangles also may be caused by bacteria, fungi, or other organisms. Grows mostly on Spruce but also on Larch and White Pine branches. Newfoundland, Ontario, and Minnesota to n. New Jersey, n. Pennsylvania, and Michigan.

MOUNTAIN-HEATH *Phyllodoce caerulea* (L.) Bab. **p. 44**

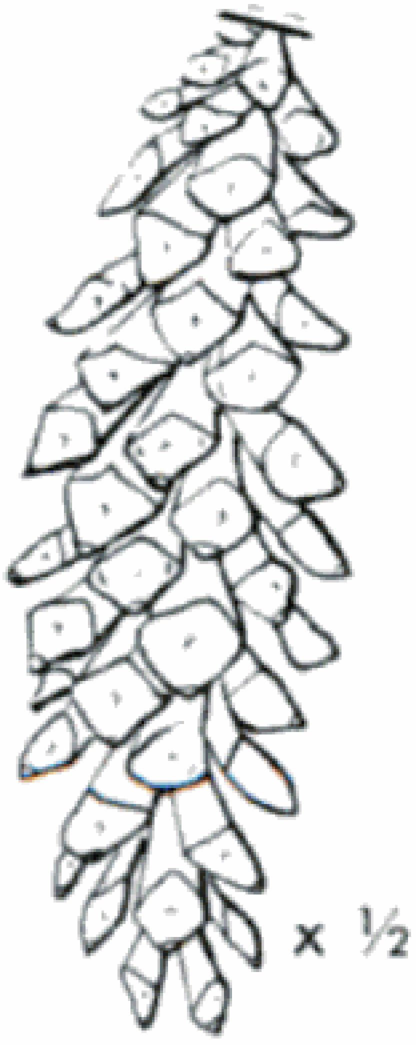
Recognition: A low shrub with *blunt flat needles* 3⁄16″–3⁄8″ long. Needle bases appear to follow along twigs for a short distance, as in American Yew (Plate 3). Older bark flaky. Height to 8″. Flowers small, cup-shaped, purplish, scattered, June–Aug. Fruits small, dry, 5-parted capsules. **Similar species:** Seedling American Yews (Plate 3) have longer pointed needles and red fleshy fruits.

GORSE *Ulex europaeus* L. **p. 44**

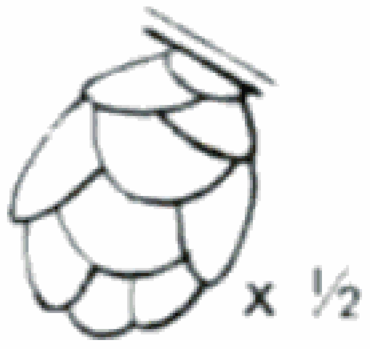
Recognition: A *very spiny* low dense shrub with sharp triangular spinelike leaves ¼″–2″ long. Twigs and branchlets are somewhat hairy and are marked by distinct lengthwise *ridges.* Buds small; no leaf scars. Height to 4′. Flowers large, yellow, May–Sept. Fruits short pods, Aug.–Oct.

Remarks: A European importation of some use as a sand binder. Reportedly very flammable when dry.

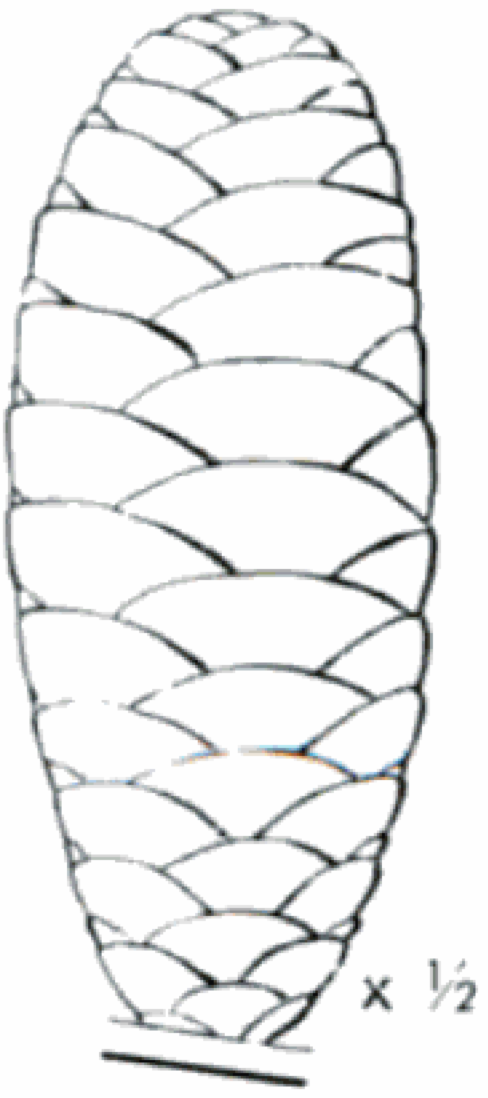
FRUITS OF CONIFERS



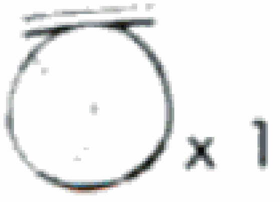
WHITE PINE



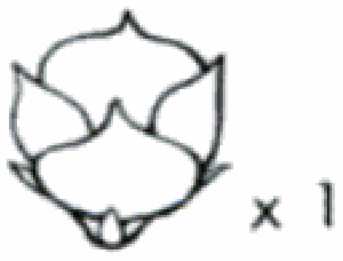
AMERICAN LARCH



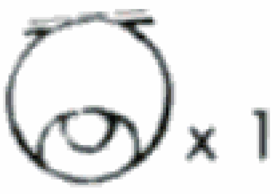
BALSAM FIR



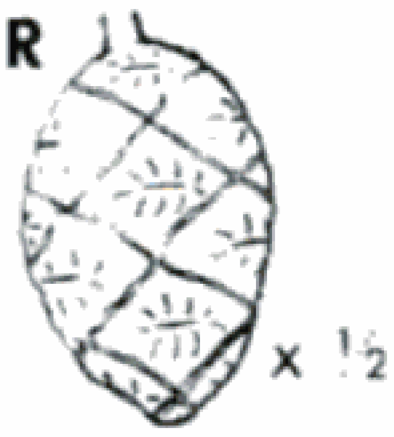
RED CEDAR



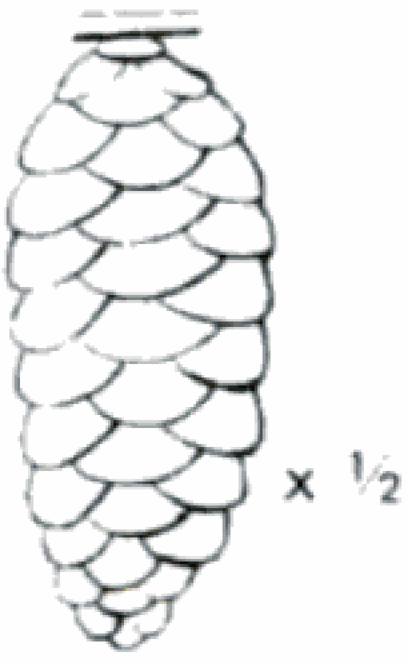
ATLANTIC WHITE CEDAR



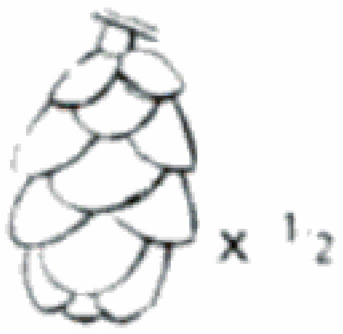
AMERICAN YEW



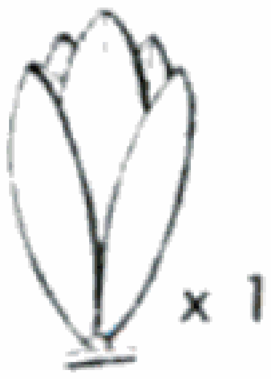
BALDCYPRESS



RED SPRUCE



HEMLOCK

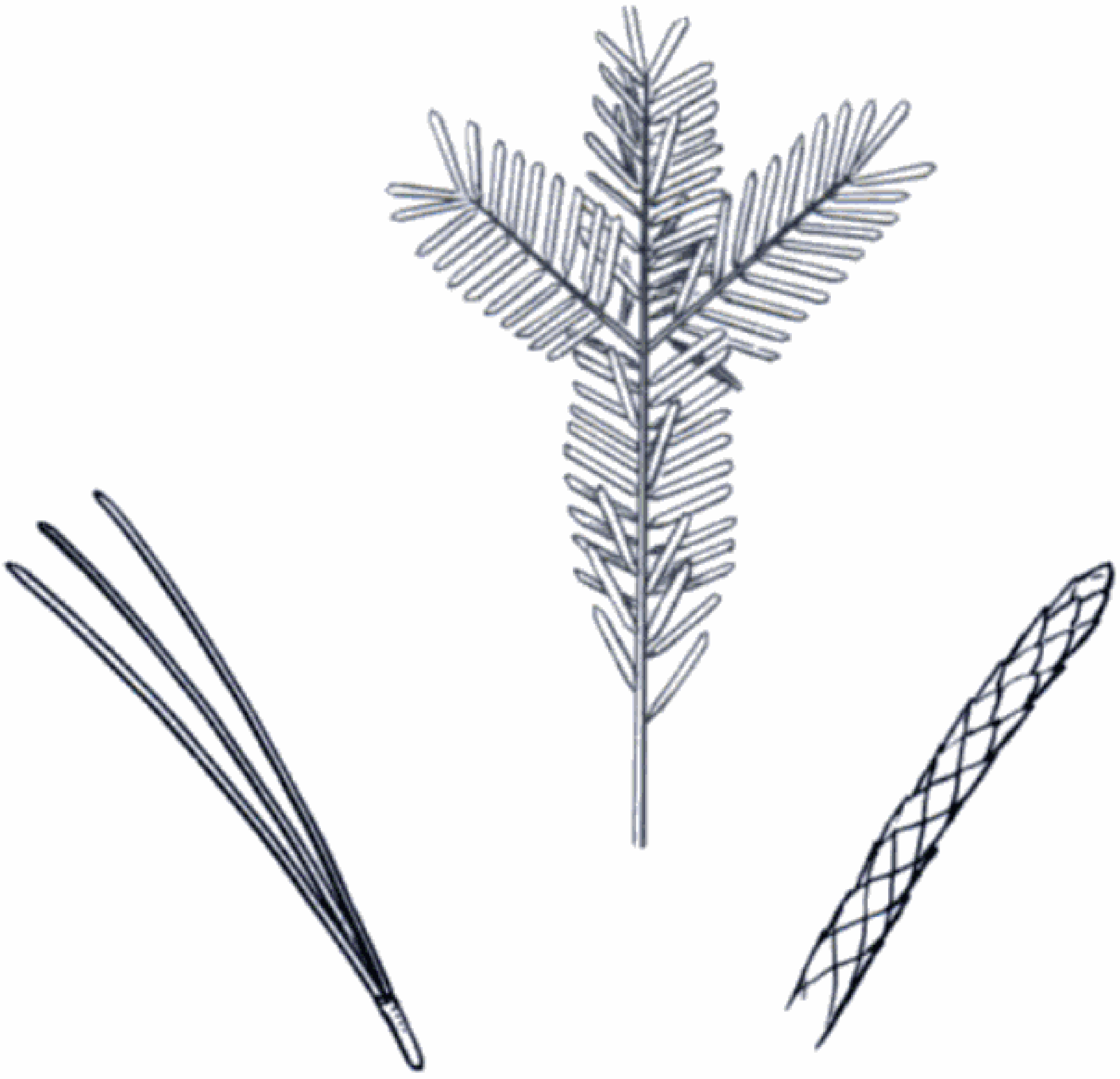


NORTHERN WHITE CEDAR

PLATES FOR SECTION I

Plants with Needlelike or Scalelike Leaves

(*Key, pages 15–16; text, pages 15–31*)



FRUITS OF CONIFERS (*opposite*)

Though the fruits of the yews and junipers are fleshy and bear little resemblance to the usual cones of members of the pine family, all are alike in having developed from naked ovules. Higher flowering plants have their ovules enclosed in ovaries.

Each yew fruit consists of a single bony seed partially surrounded by reddish pulp.

Juniper (including Red Cedar) "berries" are bluish black and covered with a whitish powder. In most junipers, they completely enclose several seeds.

Variously shaped cones are borne by the other conifers. Their seeds are developed at the bases of the cone scales.

CONIFERS WITH NEEDLES IN CLUSTERS (1): PINES

Needles 2-5 in bundles, evergreen

(3- and 5-leaved pines on this plate,
2-leaved pines on next plate)

▲ WHITE PINE, *Pinus strobus* p. 17
Uplands; Newfoundland, centr. Ontario and sw. Manitoba to e. Maryland, w. N. Carolina, n. Georgia, e. Tennessee, and ne. Iowa.

▲ PITCH PINE, *Pinus rigida* p. 17
Sterile soils; Maine, se. Ontario and e. Ohio south to w. S. Carolina, and in mts. to nw. Georgia and e. Tennessee.

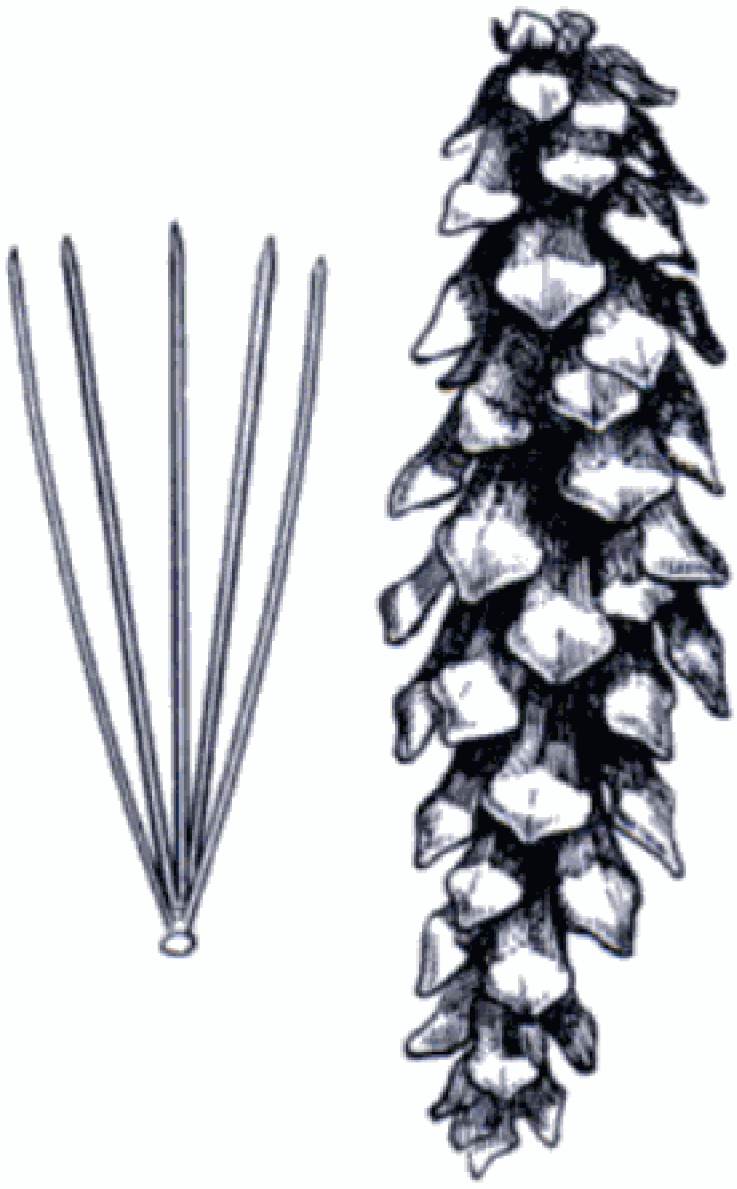
▲ SWAMP PINE, *Pinus serotina* p. 17
Coastal Plain swamps and woods; s. New Jersey to Florida and Alabama. Uncommon in our portion of range.

▲ LOBLOLLY PINE, *Pinus taeda* p. 18
Coastal Plain and Piedmont Plateau; s. New Jersey to Florida, west to e. Texas and north in Mississippi Valley to sw. Tennessee, Arkansas, and e. Oklahoma.

▲ LONGLEAF PINE, *Pinus australis* p. 18
Sandy soils; Coastal Plain from se. Virginia to Florida and west to e. Texas.

5-LEAVED PINE

WHITE PINE
Needles 2″–4″, slender.
Cones 3″–10″, thornless.



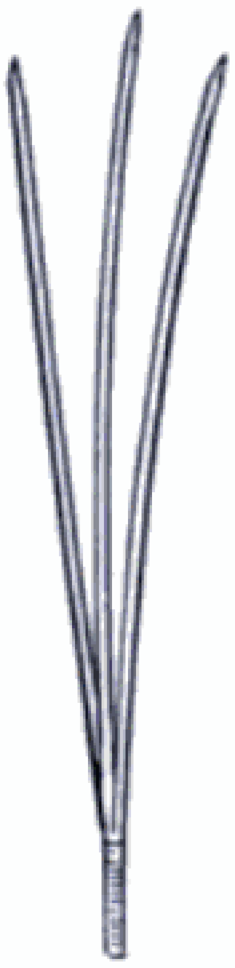
3-LEAVED PINES

PITCH PINE
Needles 2″–5″, stout.
Cones 1″–3″, with stout thorns.

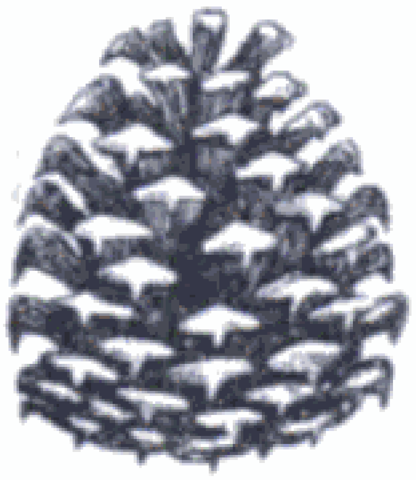
SWAMP PINE
Needles 5″–11″, stout.
Cones 2″–2½″, with weak prickles.

LOBLOLLY PINE*
Needles 5″–10″, slender.
Cones 2½″–5″, with stout thorns.

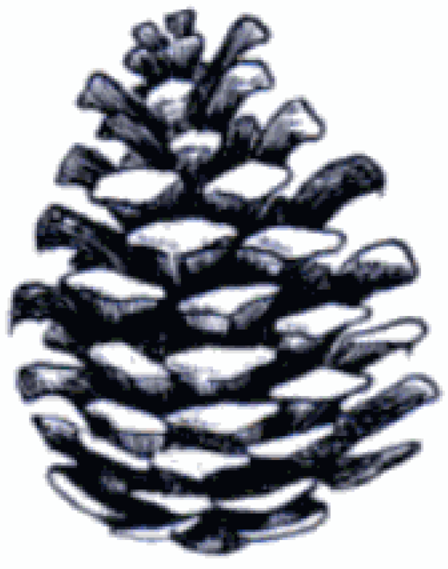
LONGLEAF PINE
Needles 8″–18″, slender.
Cones 6″–10″, with weak prickles.



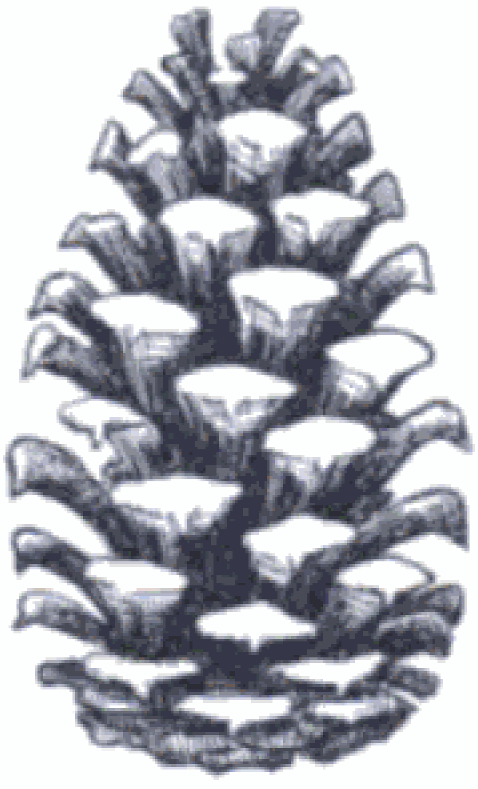
*Some specimens of Loblolly may bear both 2- and 3-needle clusters.



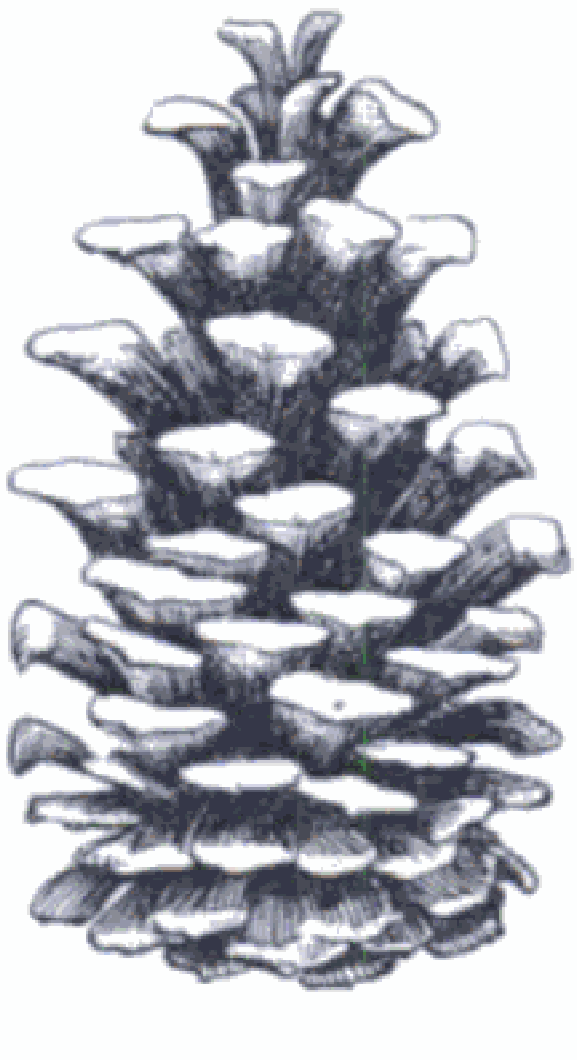
PITCH



SWAMP



LOBLOLLY



LONGLEAF

CONIFERS WITH NEEDLES IN CLUSTERS (2): PINES AND LARCHES

PINES: **Needles 2–5 in bunches, evergreen**
(2-leaved pines on this plate,
3- and 5-leaved pines on preceding plate)

LARCHES: **Needles numerous at the ends of warty spur branches; drop in autumn**

↟ SHORTLEAF PINE, *Pinus echinata* p. 18
Dry soils; se. New York, New Jersey, Pennsylvania, s. Ohio, s. Illinois, s. Missouri, and e. Oklahoma to n. Florida and ne. Texas.

↟ RED PINE, *Pinus resinosa* p. 18
Dry soils; Newfoundland, Ontario, and se. Manitoba to n. New Jersey, n. Pennsylvania, Michigan, and Minnesota; locally in e. W. Virginia.

↟ JACK PINE, *Pinus banksiana* p. 19
Poor dry soils; Nova Scotia, n. Quebec, Northwest Territories and n. British Columbia to n. New England, n. New York, nw. Indiana, n. Illinois, Minnesota, s. Manitoba, and centr. Alberta.

↟ SCRUB PINE, *Pinus virginiana* p. 19
Poor soils; se. New York, Pennsylvania, and s. Indiana to n. Georgia, Alabama, and Mississippi.

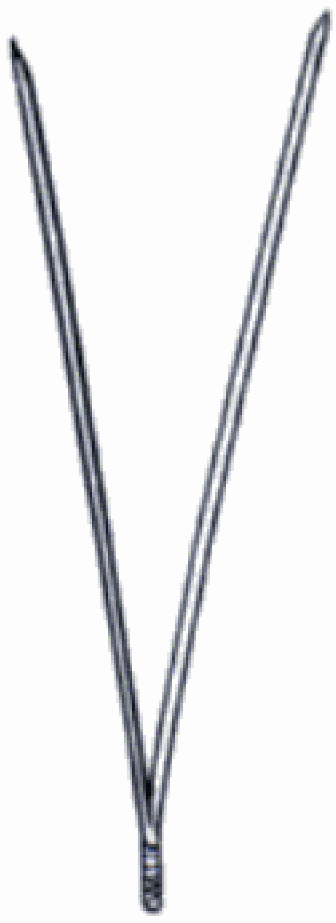
↟ SCOTCH PINE, *Pinus sylvestris* p. 19
Spreading from plantings; New England, Ontario, and Michigan to Delaware and Iowa.

↟ MOUNTAIN PINE, *Pinus pungens* p. 19
Appalachians and foothills; local, New Jersey and Pennsylvania to S. Carolina, Georgia, and Tennessee.

↟ AMERICAN LARCH (TAMARACK), *Larix laricina* p. 20
Wooded swamps and bogs; Newfoundland, Labrador, and Alaska to n. New Jersey, n. Maryland, n. W. Virginia, ne. Illinois, Minnesota, and nw. British Columbia.

↟ EUROPEAN LARCH, *Larix decidua* p. 20
European; mostly uplands; sometimes spreads from plantings.

2-LEAVED PINES



Needles 3″–8″, slender

SHORTLEAF PINE*
Southern distribution, twigs whitish.
Cones 1½″–3″, usually weakly thorny.

RED PINE
Northern distribution, twigs brown.
Cones 1½″–2½″, thornless.

Needles ½″–3″, usually stout

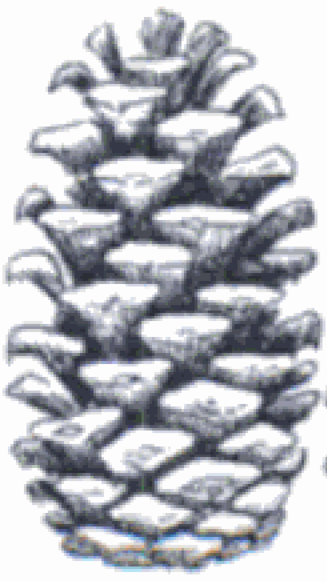
JACK PINE
Needles usually very short, ¾″–1⅝″.
Cones 1¼″–2″, lopsided, thornless.

SCRUB PINE
Needles longer, 1½″–3″. Twigs whitish.
Cones 1½″–2½″, thorny.

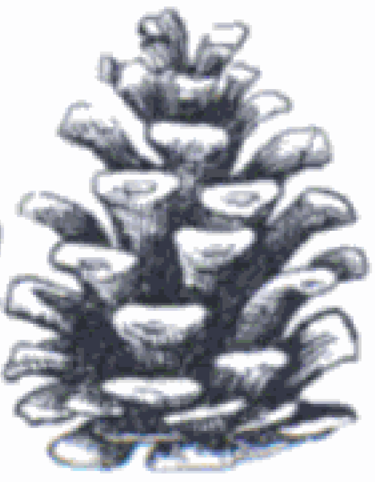
SCOTCH PINE
Needles 1½″–3″. Twigs yellow to brown.
Cones 1¼″–2½″, thornless.

MOUNTAIN PINE*
Needles 1½″–3″. Twigs yellow to brown.
Cones 2″–3½″, very thorny.

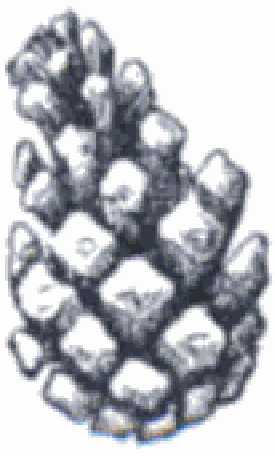
*Some specimens may bear both 2- and 3-needle clusters (most bundles, however, have 2 needles).



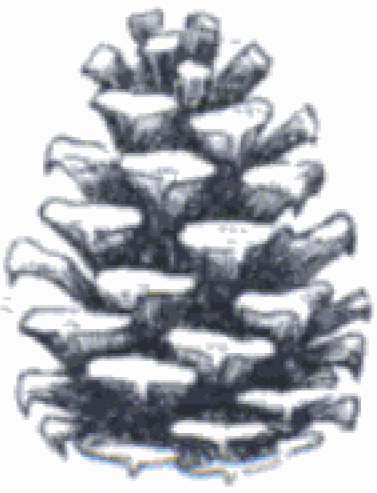
SHORTLEAF



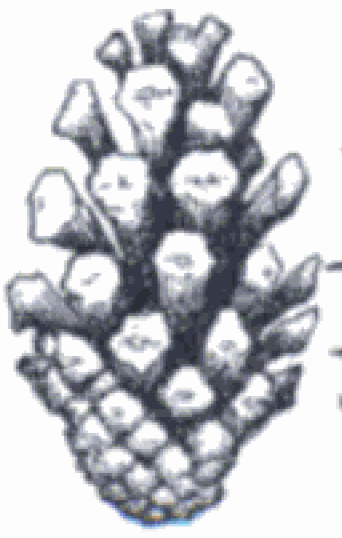
RED



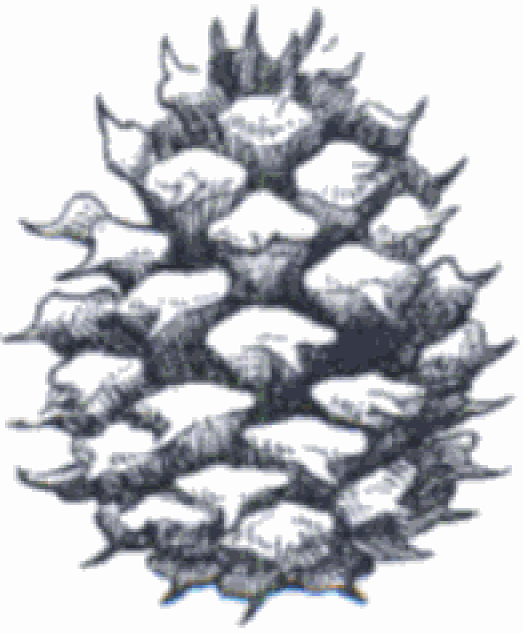
JACK



SCRUB



SCOTCH



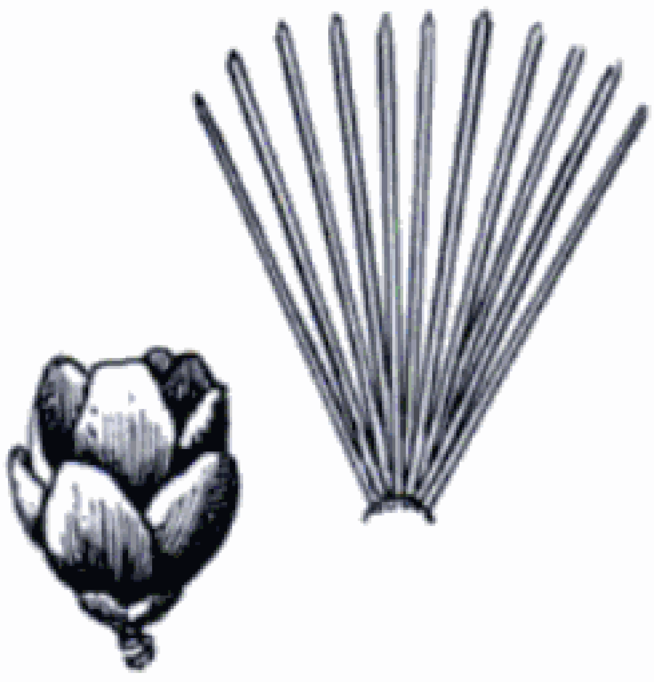
MOUNTAIN

LARCHES

Needles mainly numerous on spurs, dropping in autumn

AMERICAN LARCH (Tamarack)
Needles ⅜″–1″ long; cones less than 13/16″; lateral branchlets not drooping; bark shedding in small pieces; mostly swamps.

EUROPEAN LARCH
Needles mostly more than 1″; cones more than 13/16″; lateral branchlets drooping; bark shedding in large plates; mostly uplands.



CONIFERS WITH FLAT NEEDLES

Needles attached singly; needles and twigs arranged in flat sprays.

⍋ BALSAM FIR, *Abies balsamea* p. 21
Bottomland and moist woods; Newfoundland, Labrador, and ne. Alberta to New England, w. Virginia, e. W. Virginia, ne. Ohio, ne. Iowa, and Minnesota.

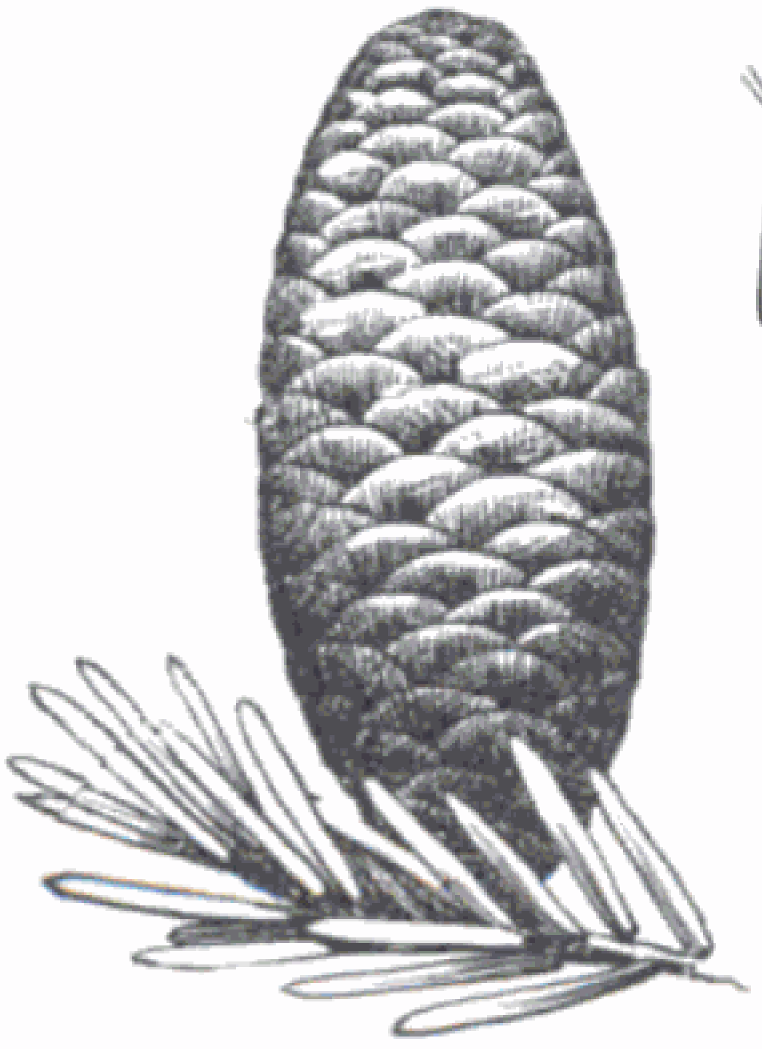
⍋ FRASER FIR, *A. fraseri* (not illus.) p. 21
Mostly above 4000 ft. in mts.; sw. Virginia, w. N. Carolina, and e. Tennessee.

⍋ EASTERN HEMLOCK, *Tsuga canadensis* p. 21
Well-drained or moist woods; Nova Scotia, s. Ontario, n. Michigan, e. Minnesota to Maryland, Kentucky, and Indiana, and in mts. to n. Georgia and n. Alabama.

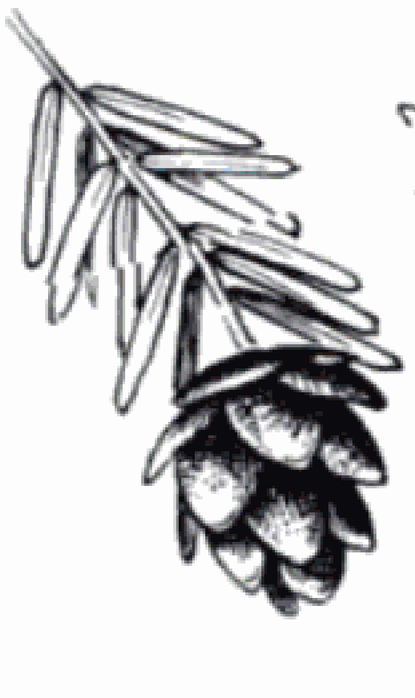
⍋ CAROLINA HEMLOCK, *T. caroliniana* (not illus.) p. 22
Mountains; from W. Virginia to w. S. Carolina, n. Georgia, and e. Tennessee.

∨ AMERICAN YEW, *Taxus canadensis* p. 22
Moist woods; Newfoundland and Manitoba to New England, w. Virginia, ne. Kentucky, and ne. Iowa.

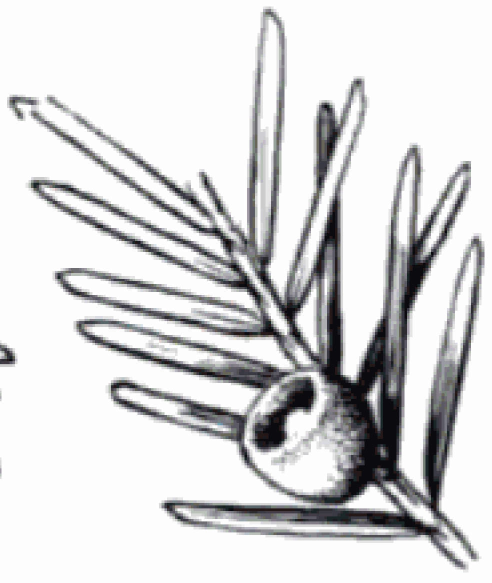
⍋ BALDCYPRESS, *Taxodium distichum* p. 22
Flooded swamps and along streambanks; Coastal Plain from s. New Jersey to Florida, west to Texas, and north in Mississippi Valley to sw. Indiana, s. Illinois, w. Kentucky, and se. Missouri.



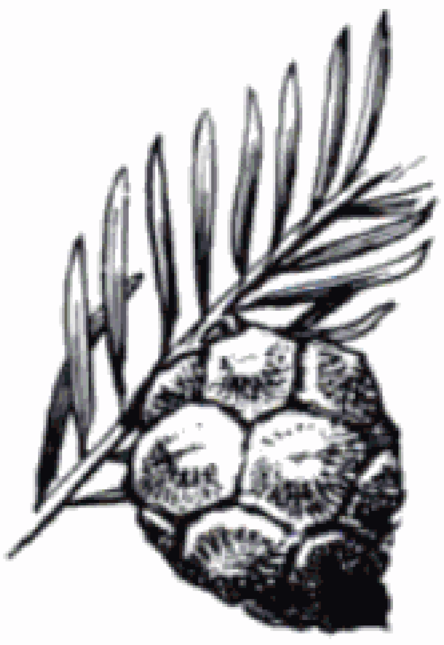
BALSAM FIR



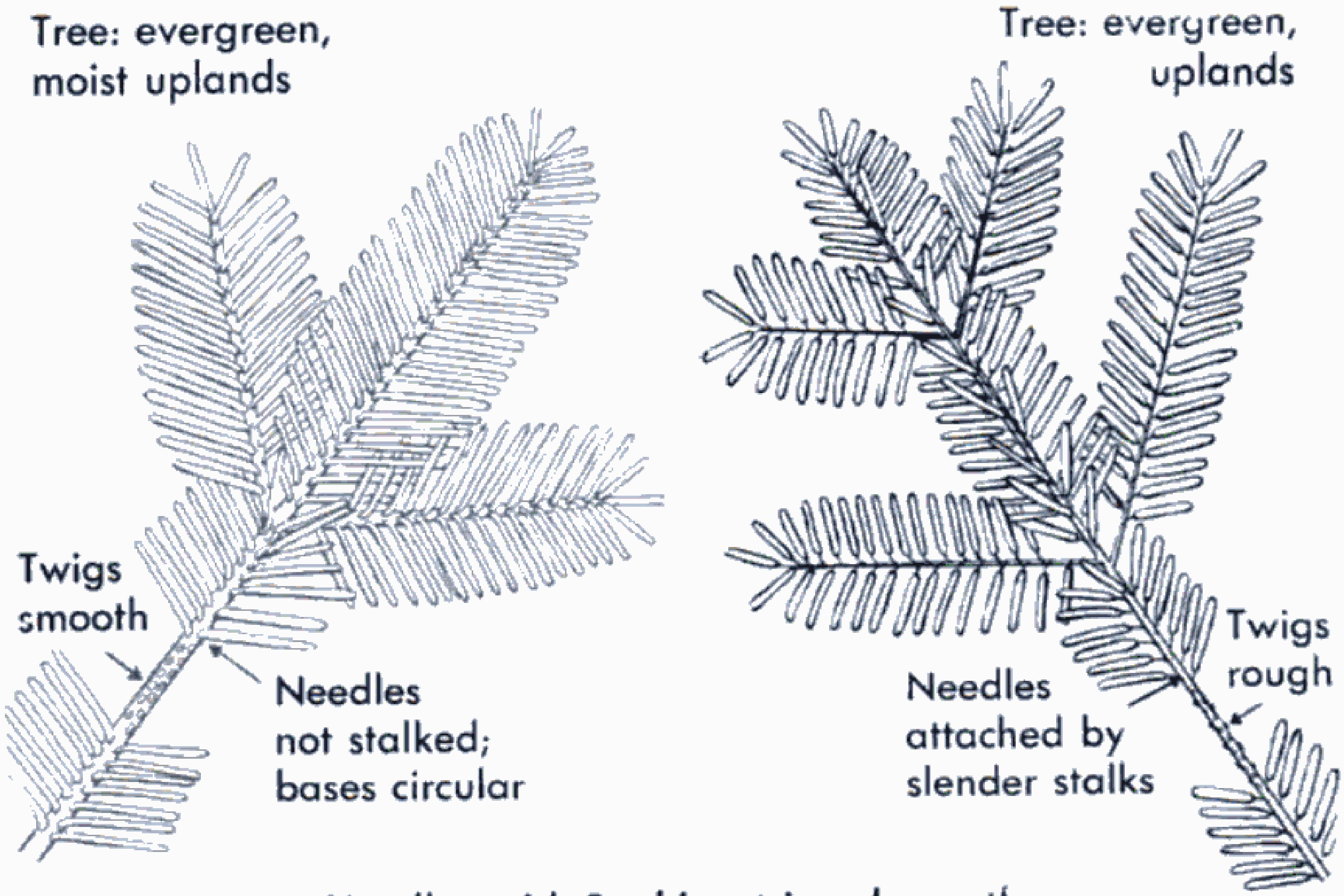
HEMLOCK



YEW

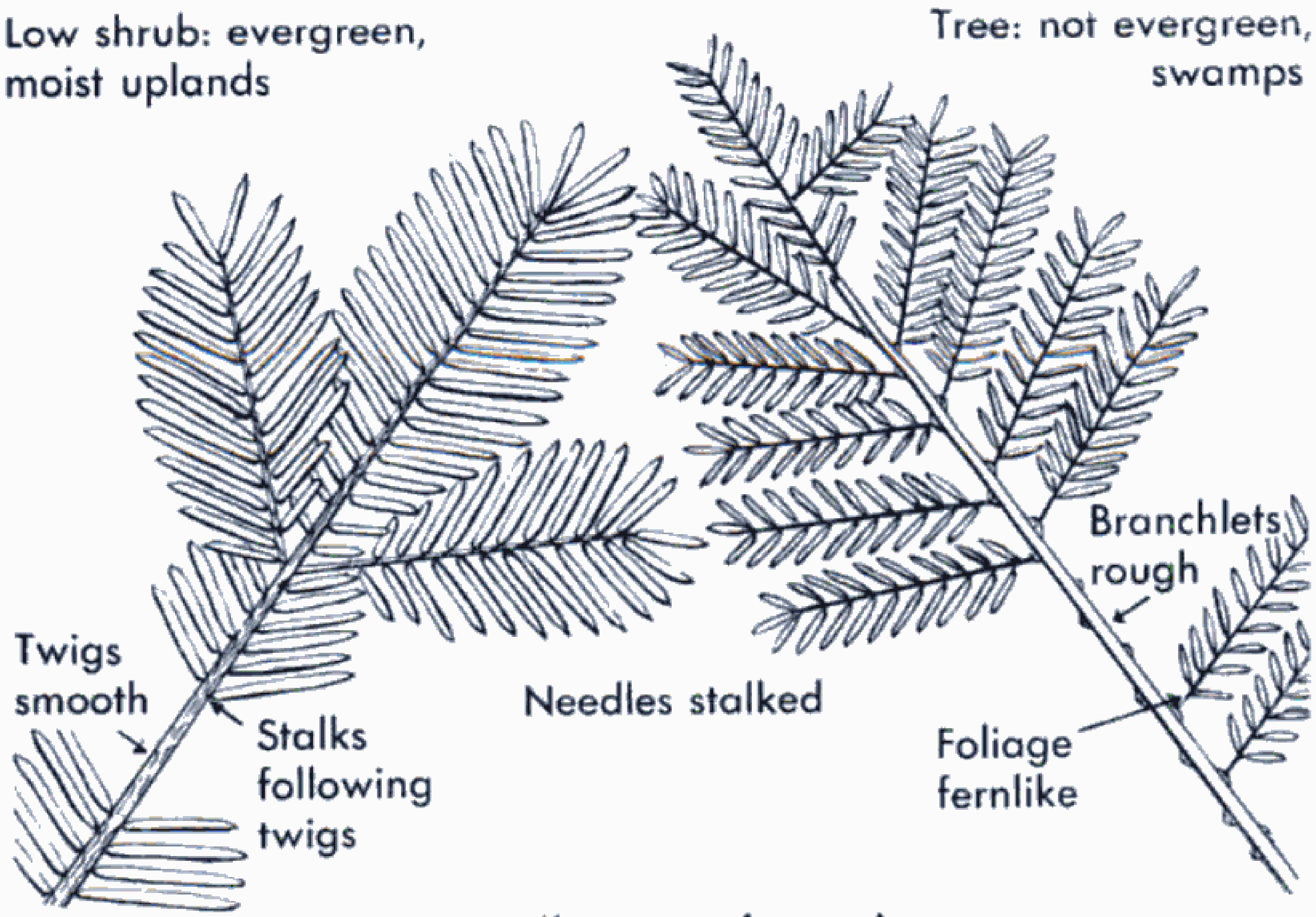


BALDCYPRESS


Tree: evergreen, moist uplands
Twigs smooth
Needles not stalked; bases circular
Tree: evergreen, uplands
Twigs rough
Needles attached by slender stalks

Needles with 2 white stripes beneath

BALSAM FIR **EASTERN HEMLOCK**


Low shrub: evergreen, moist uplands
Twigs smooth
Stalks following twigs
Needles stalked
Tree: not evergreen, swamps
Branchlets rough
Foliage fernlike

Needles green beneath

AMERICAN YEW **BALDCYPRESS**

CONIFERS WITH MOSTLY 4-SIDED NEEDLES: SPRUCES

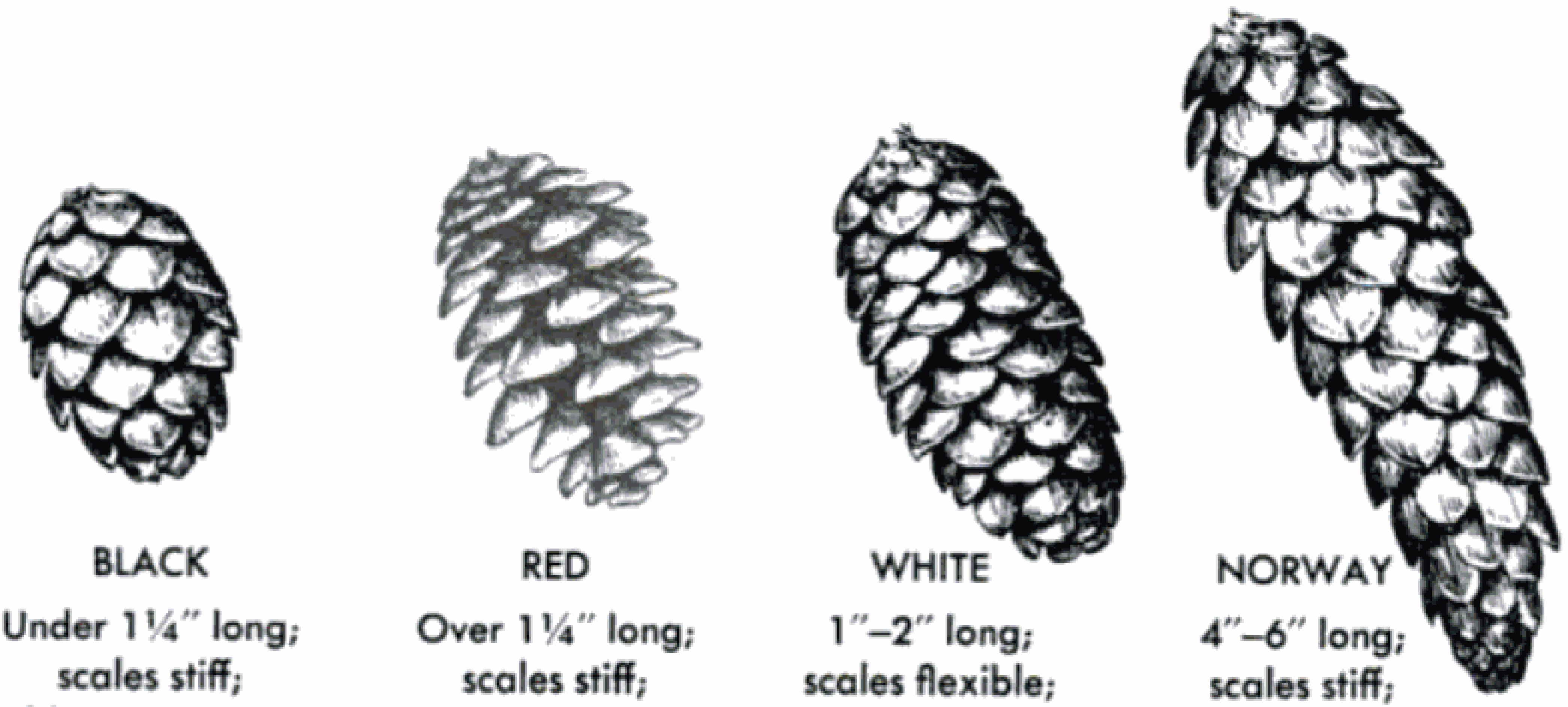
Needles square in cross section, stiff, sharp, attached
singly. Branchlets rough when needles removed.
Cones hang pendently; brown, woody.

▲ RED SPRUCE, *Picea rubens* p. 23
Well-drained soils; Nova Scotia and s. Quebec to n. New Jersey, ne. Pennsylvania, and e. New York; also in mts. from w. Maryland and W. Virginia to w. N. Carolina and e. Tennessee.

▲ BLACK SPRUCE, *Picea mariana* p. 24
Bogs and wet soils; Newfoundland, Labrador, and Alaska to n. New Jersey, n. Pennsylvania, Michigan, n. Minnesota, s. Manitoba, and British Columbia.

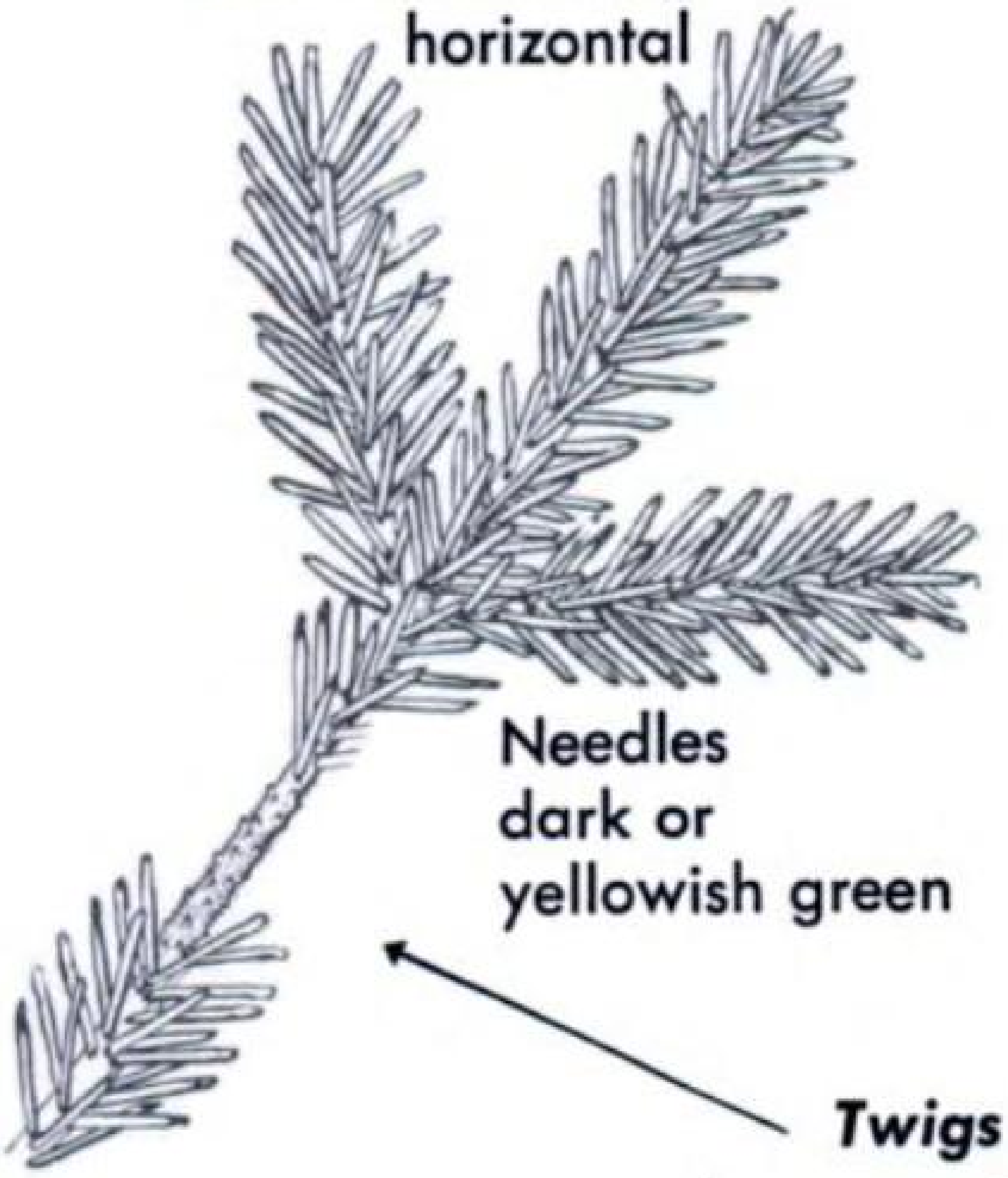
▲ NORWAY SPRUCE, *Picea abies* p. 24
European; occasionally spreading from plantings, on uplands.

▲ WHITE SPRUCE, *Picea glauca* p. 24
Upland soils; Newfoundland, Labrador, and Alaska to Maine, nw. Massachusetts, n. New York, Michigan, Minnesota, w. S. Dakota, and Wyoming.



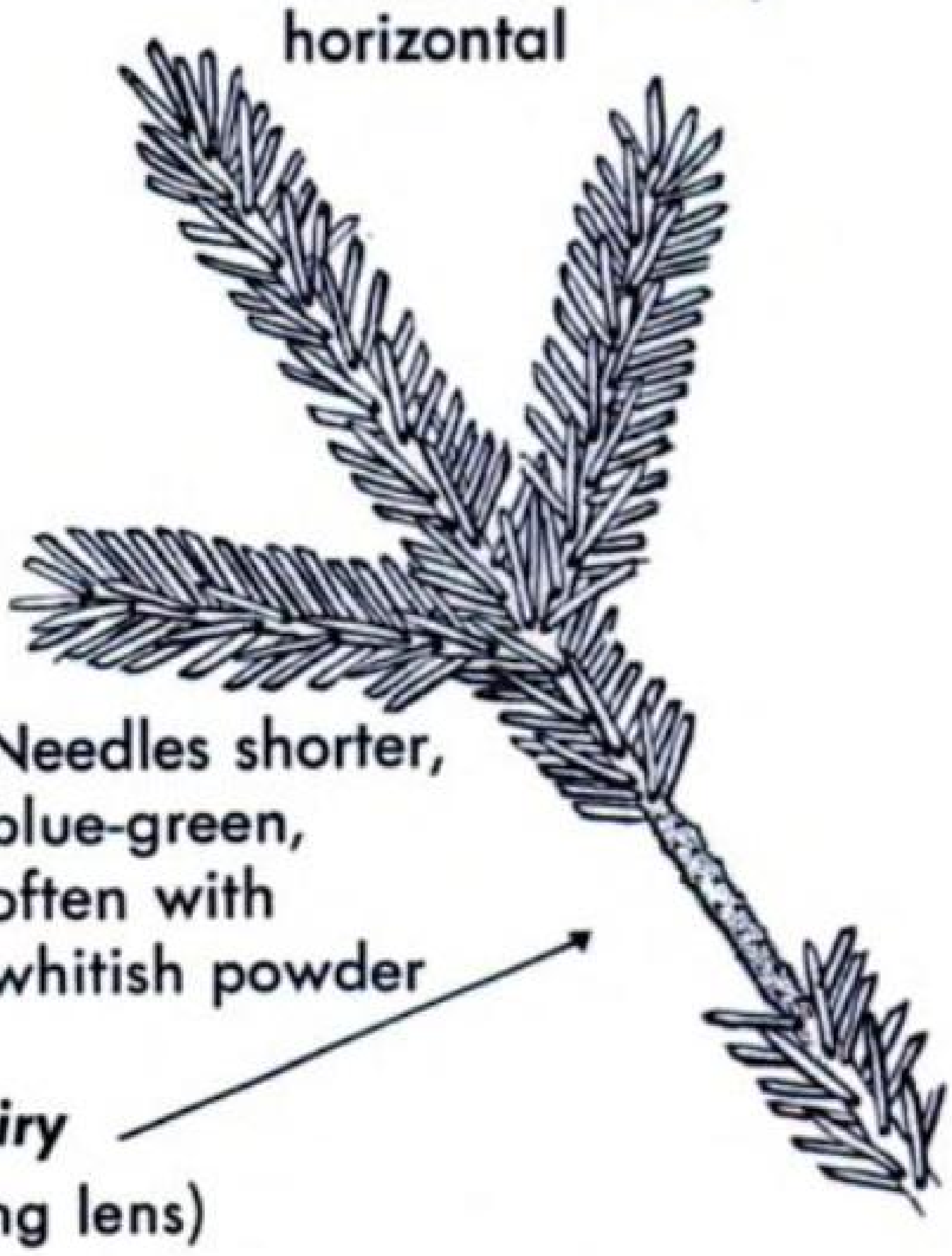
BLACK	RED	WHITE	NORWAY
Under 1¼″ long; scales stiff; old cones remain on tree for years.	Over 1¼″ long; scales stiff; mostly falling upon ripening.	1″–2″ long; scales flexible; mostly falling upon ripening.	4″–6″ long; scales stiff; mostly falling upon ripening.

CONES OF SPRUCES



Branchlets mostly horizontal

Needles dark or yellowish green



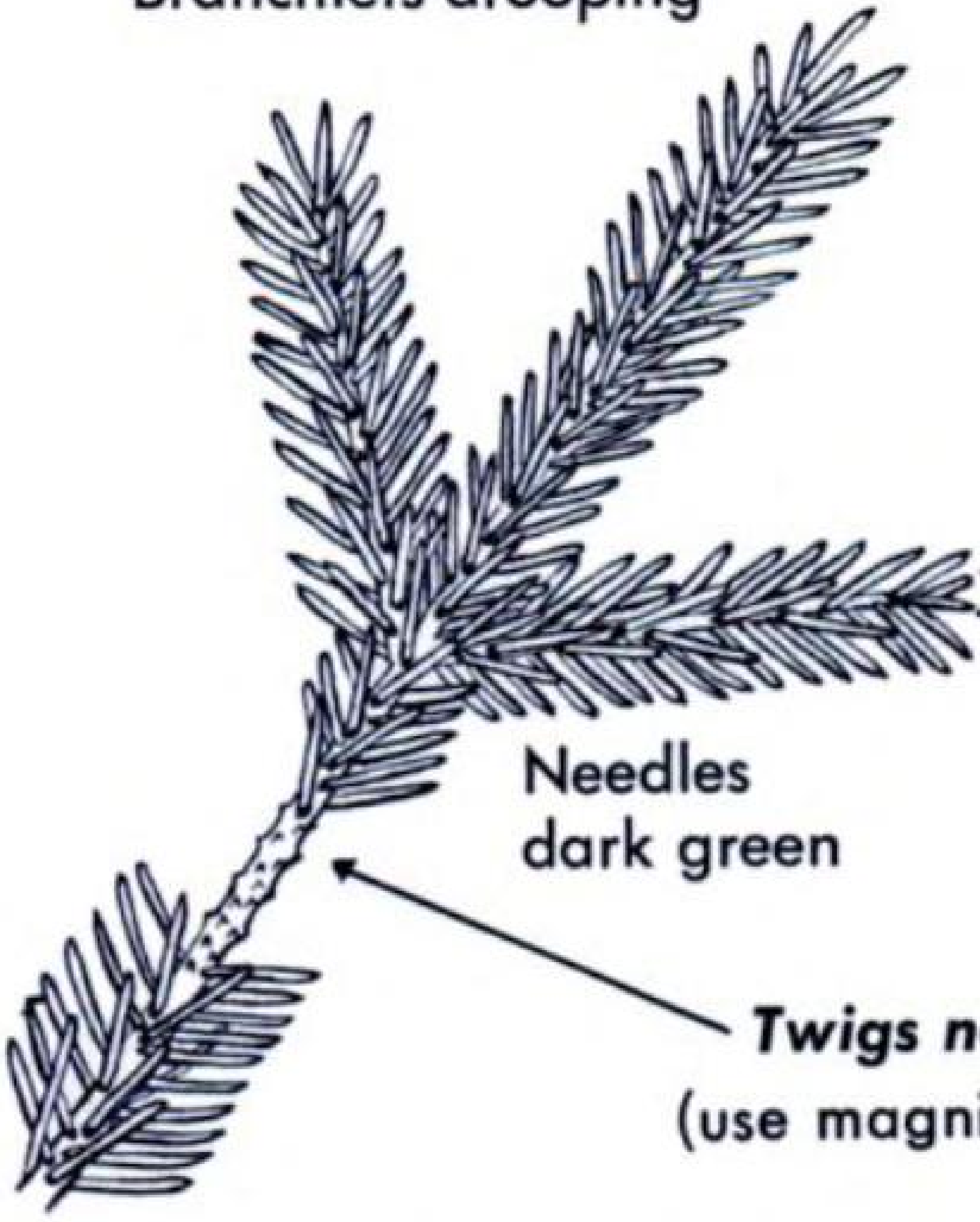
Branchlets mostly horizontal

Needles shorter, blue-green, often with whitish powder

Twigs hairy
(use magnifying lens)

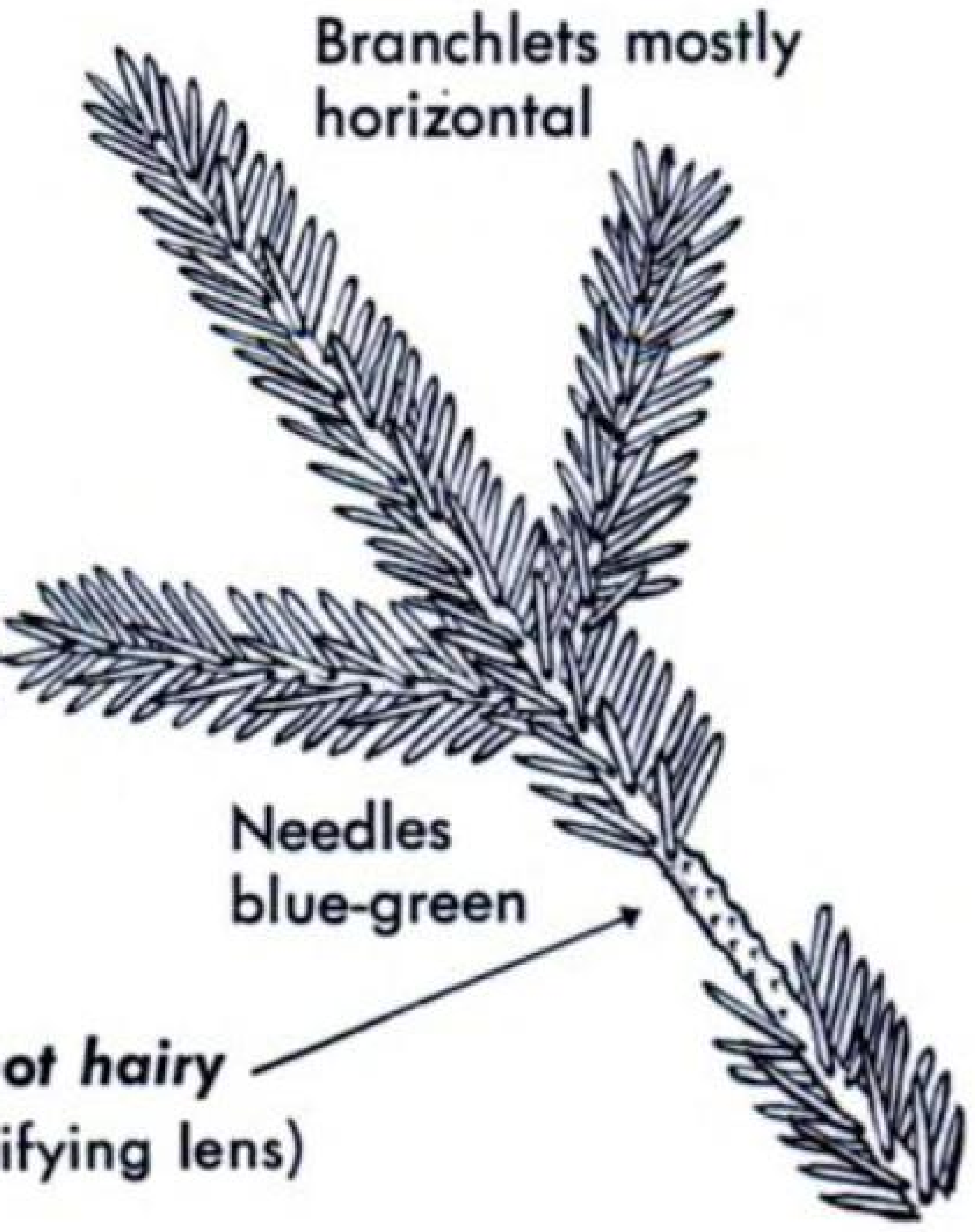
RED

BLACK



Branchlets drooping

Needles dark green



Branchlets mostly horizontal

Needles blue-green

Twigs not hairy
(use magnifying lens)

NORWAY

WHITE

CONIFERS WITH SCALELIKE OR 3-SIDED HOLLOWED LEAVES

Leaves in pairs or whorls and of 2 types, either or both of which may be present as indicated on opposite page.

↟ NORTHERN WHITE CEDAR (ARBOR VITAE) p. 25
Thuja occidentalis
Swamps and limestone soils; Nova Scotia, Quebec, n. Ontario and s. Manitoba to s. New York, s. Ohio, n. Illinois and e. Minnesota; in mts. to w. N. Carolina and e. Tennessee.

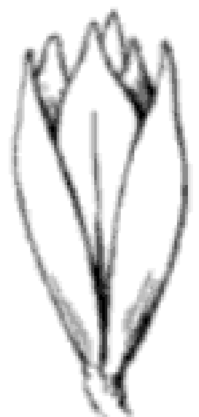
↟ ATLANTIC WHITE CEDAR p. 25
Chamaecyparis thyoides
Swamps near coast; s. Maine to n. Florida and west to Mississippi.

↟Ѵ DWARF JUNIPER, *Juniperus communis* p. 26
Rocky infertile soils; Greenland and Alaska to Virginia, w. Illinois, Minnesota, New Mexico, and California; in mts. to w. S. Carolina, n. Georgia, and e. Tennessee.

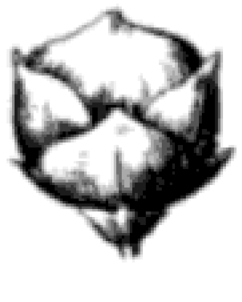
↟ RED CEDAR, *Juniperus virginiana* p. 26
Dry soils, old fields; sw. Maine, s. Quebec, s. Ontario, s. Michigan, s. Minnesota, and sw. N. Dakota to Georgia and Texas.

↟Ѵ MEXICAN JUNIPER, *J. mexicana* (not illus.) p. 27
Sw. Missouri and w. Texas westward.

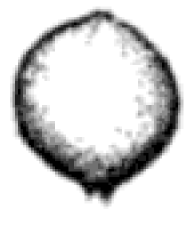
Ѵ TRAILING JUNIPER, *Juniperus horizontalis* p. 27
Dry, mostly sandy soils; Newfoundland and Alaska to Maine, nw. New York, n. Illinois, Nebraska, and Wyoming.



NORTHERN WHITE CEDAR



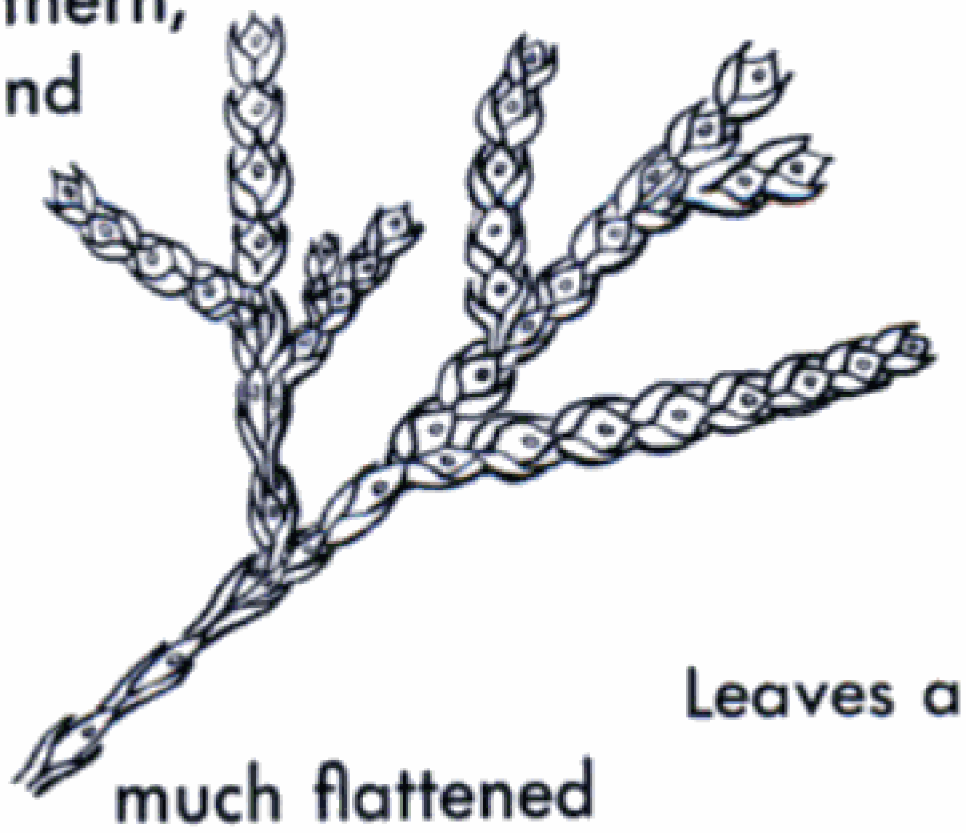
ATLANTIC WHITE CEDAR

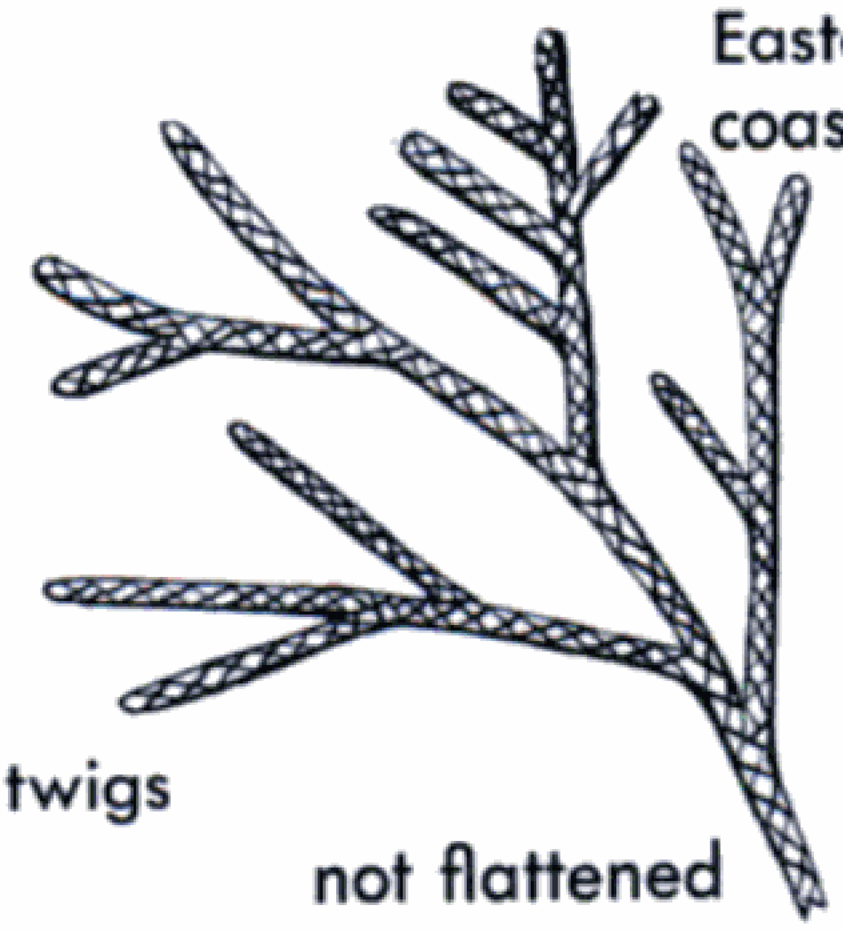


RED CEDAR (AND JUNIPERS)

Leaves scalelike, hugging the twigs and branchlets

Trees


Northern, inland
much flattened

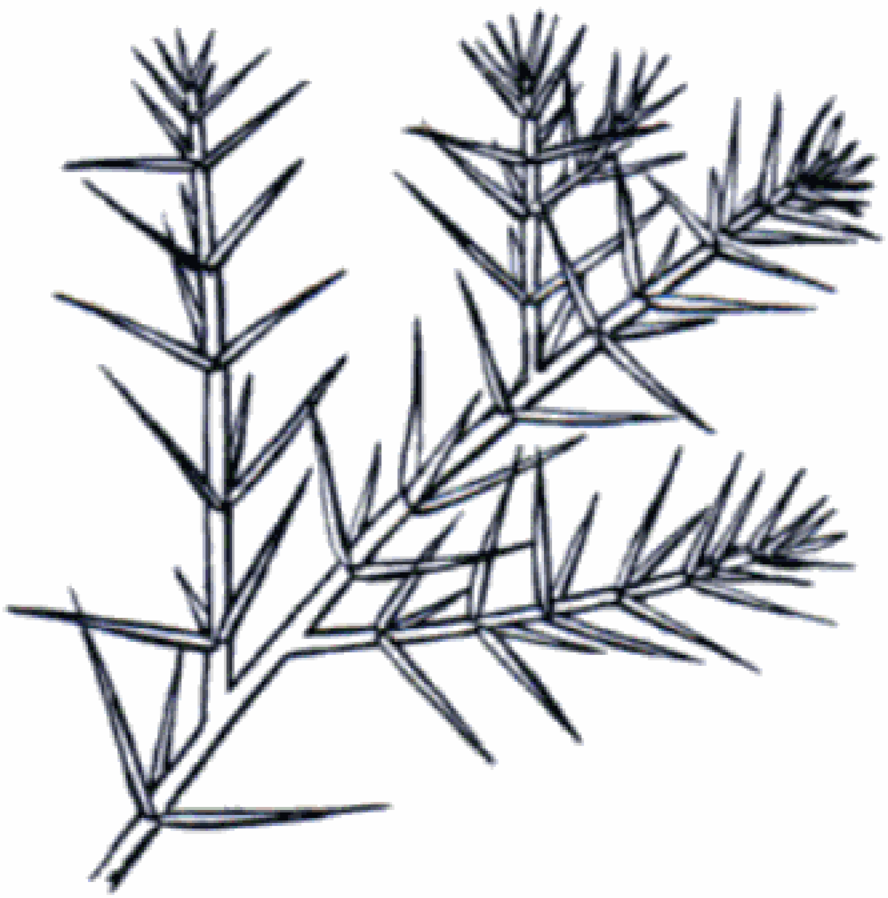

Eastern, coastal
not flattened

Leaves and twigs

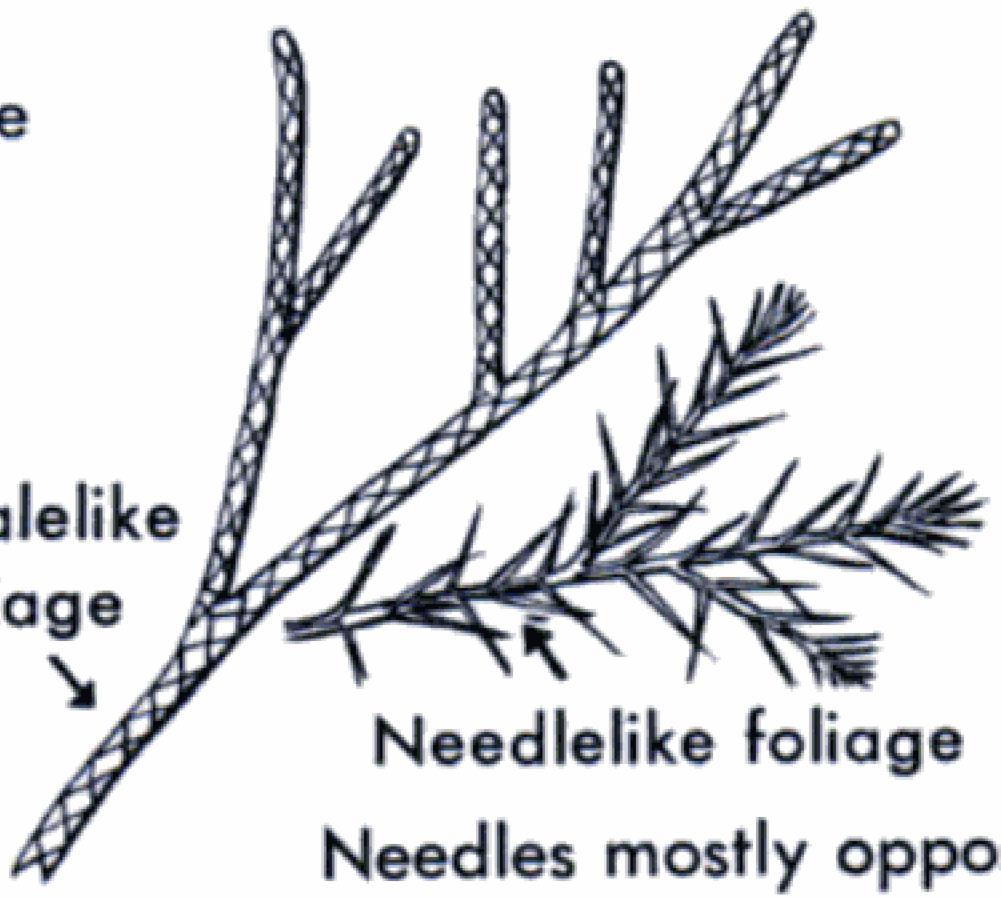
NORTHERN WHITE CEDAR

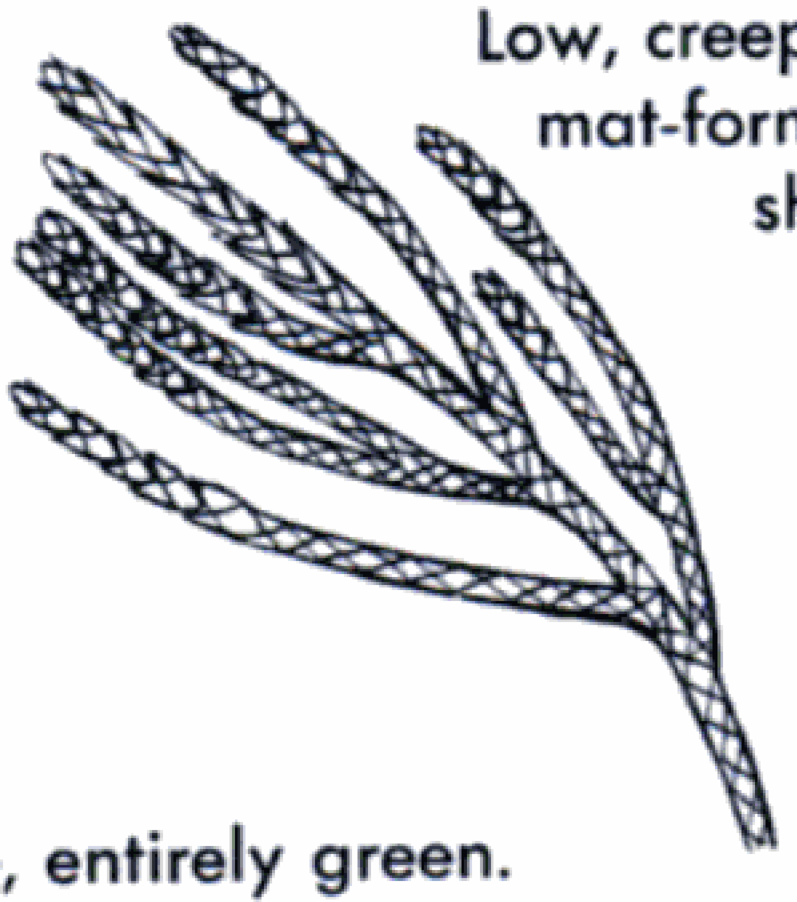
ATLANTIC WHITE CEDAR

Leaves scalelike, hugging twigs and branchlets, or 3-sided hollow needles, or mixed,
with scales on older branches, needles on twigs
Fruits, bluish berries


Low shrub, some varieties matlike; rarely a small tree
Needles in whorls of 3, one side white
Branchlets 3-sided

DWARF JUNIPER


Tree
Scalelike foliage
Needlelike foliage


Low, creeping, mat-forming shrub

Needles mostly opposite, entirely green.
Scale-covered branchlets 4-sided

RED CEDAR

TRAILING JUNIPER

NEEDLE-BEARING, NON-CONE-BEARING EVERGREENS

Flowering plants that, excepting Tamarisk, Gorse, and Dwarf Mistletoe, are creeping, mat-forming. Dry fruit capsules, pods, or berries often present.

ѱ DOWNY HUDSONIA, *Hudsonia ericoides* p. 28
Sands and poor soils near the coast; Newfoundland and Prince Edward I. to New Jersey and Delaware.

ѱ WOOLLY HUDSONIA, *Hudsonia tomentosa* p. 28
Sands, especially along coast and Great Lakes; Prince Edward I., s. Labrador, and n. Alberta to N. Carolina, n. Indiana, Illinois, and Saskatchewan.

  ↑ѱ TAMARISK, *Tamarix gallica* (not illus.) p. 28

ѱ HEATHER, *Calluna vulgaris* p. 28
European; established on sandy or acid soils; local, Newfoundland and Michigan to New Jersey and W. Virginia.

ѱ CASSIOPE, *Cassiope hypnoides* p. 29
Tundras and mountaintops; from the Far North to Maine, New Hampshire and New York.

  ѱ CROSSLEAF HEATH, *Erica tetralix* (not illus.) p. 29
  ѱ CORNISH HEATH, *E. vagans* (not illus.) p. 29
  ѱ SCOTCH HEATH, *E. cinerea* (not illus.) p. 29

ѱ BROOM-CROWBERRY, *Corema conradii* p. 29
Sandy and rocky places near coast; Newfoundland to New Jersey.

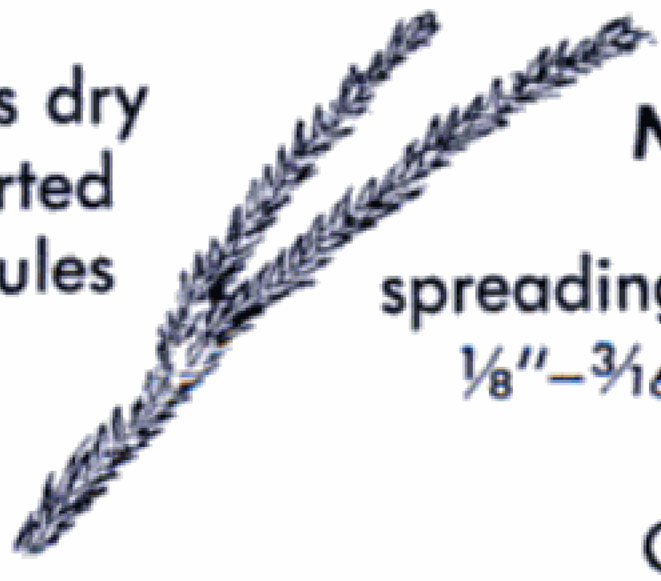
ѱ BLACK CROWBERRY, *Empetrum nigrum* p. 29
Acid and sandy soils; Arctic to n. New England, n. Michigan, n. Minnesota, s. Alberta, and n. California and on e. Long Island.

  ѱ PURPLE CROWBERRY p. 30
  E. atropurpureum (not illus.)
  ѱ ROCK CROWBERRY, *E. eamesii* (not illus.) p. 30
  ѱ DWARF MISTLETOE p. 30
  Arceuthobium pusillum (not illus.)
  Parasitic mostly on Spruce, but also on Larch and White Pine branches; Newfoundland, Ontario, and Minnesota to n. New Jersey, n. Pennsylvania, and Michigan.

ѱ MOUNTAIN-HEATH, *Phyllodoce caerulea* p. 30
Tundras and bogs; south to Newfoundland, Quebec, Maine, and New Hampshire.

ѱ GORSE, *Ulex europaeus* p. 30
European; sandy areas; escape from se. Massachusetts to Virginia and W. Virginia and on the West Coast.

Fruits dry
1-parted
capsules



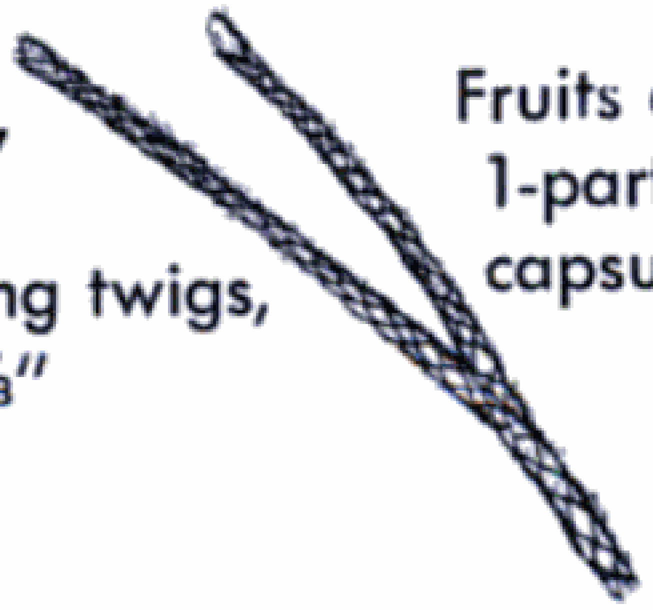
DOWNY HUDSONIA

Needles white-hairy

spreading, ⅛"–3/16"

hugging twigs, 1/16"–⅛"

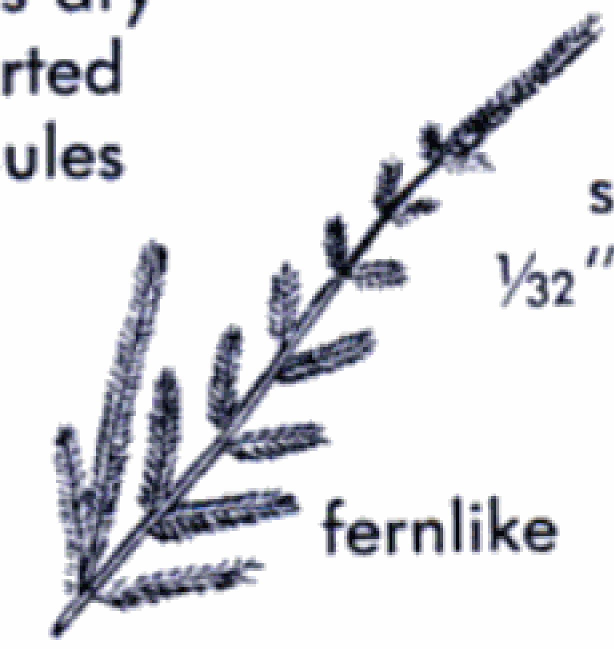
Older bark flaking



Fruits dry
1-parted
capsules

WOOLLY HUDSONIA

Fruits dry
4-parted
capsules



fernlike

HEATHER

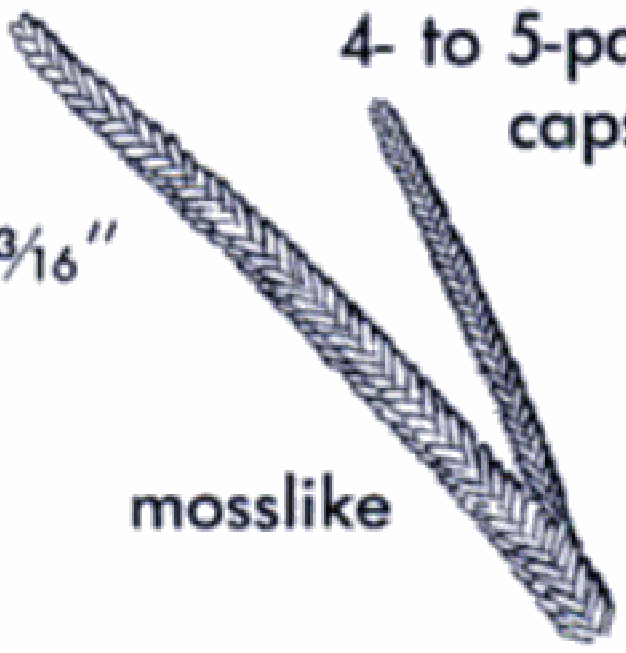
Needles green

sharp, 1/32"–1/16"

blunt, 1/16"–3/16"

Leafy twigs 4-sided

Older bark smooth

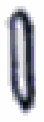


mosslike

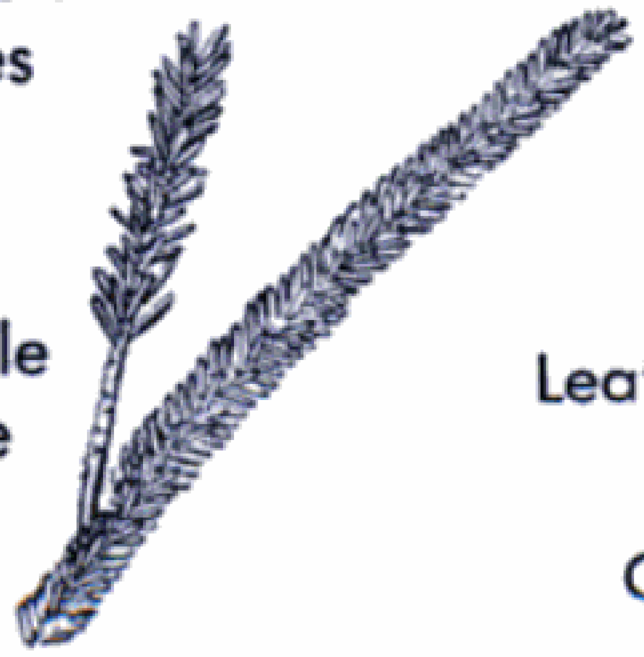
Fruits dry
4- to 5-parted
capsules

CASSIOPE

Fruits dryish
3- to 5-seeded
berries



Needle
shape

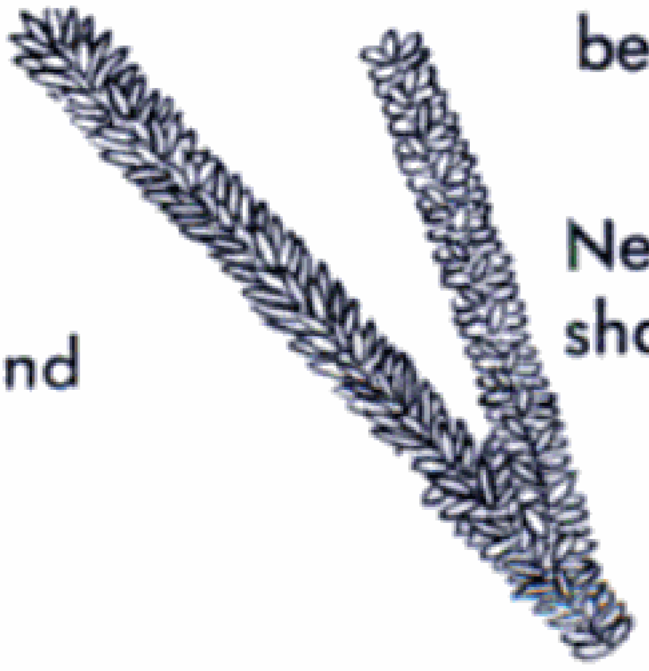


BROOM-CROWBERRY

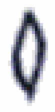
Needles green
⅛"–¼"

Leaf twigs mostly round
in cross section

Older bark flaking



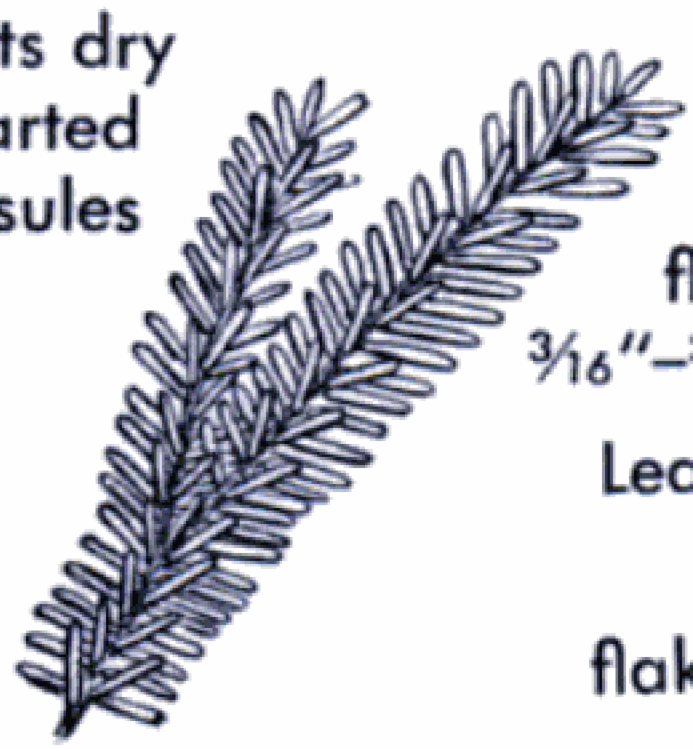
Fruits juicy
6- to 9-seeded
berries



Needle
shape

BLACK CROWBERRY

Fruits dry
5-parted
capsules



MOUNTAIN-HEATH

Needles green

flat, 3/16"–⅜"

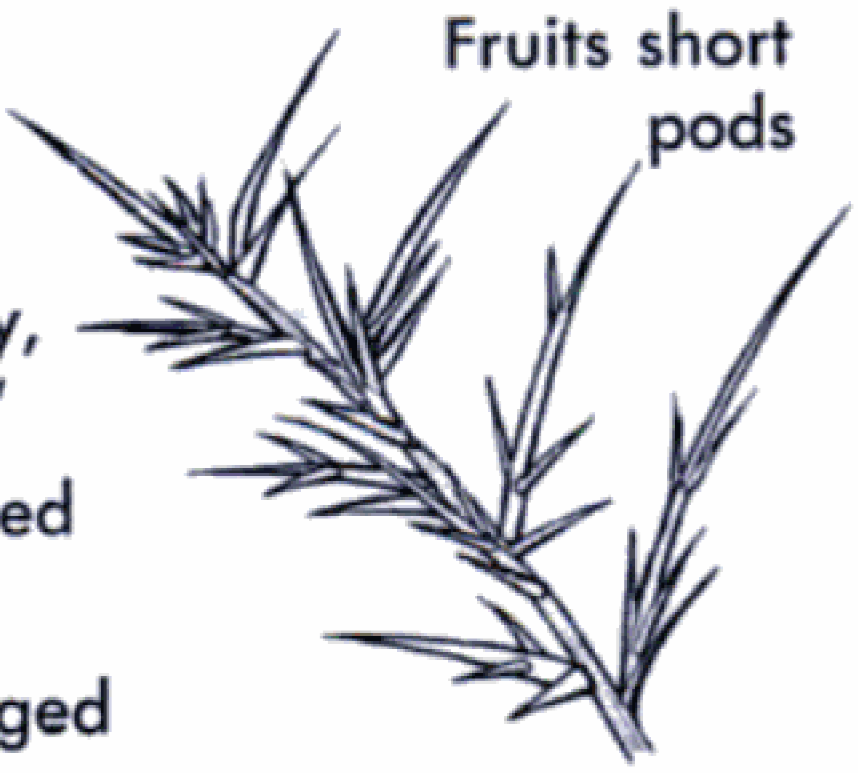
thorny, ¼"–2"

Leafy twigs not 4-sided

Older bark

flaking

ridged



Fruits short
pods

GORSE

SECTION II

Broad-leaved Plants with Opposite Compound Leaves

ONLY a few plants bear leaves of this type. Their identification, therefore, is comparatively simple when foliage is present. In winter, however, unless dead or evergreen leaves are attached to the twigs, there are no certain clues to indicate whether the plant once bore compound or simple leaves. Then, this Section must be grouped with the next, whose twigs also bear opposite (occasionally whorled) leaf scars and buds. The twigs of a leafless unknown plant with opposite leaf scars may be compared with the drawings in Sections II and III.

Some alternate-leaved plants bear stubby, scarred, leaf-crowded spur branches (see p. 310). Care should be taken that their leaves and leaf scars are not assumed to be opposite or whorled because of this crowding. None of the plants in our area with true opposite or whorled leaf scars ever develop spur branches. Select twigs with uncrowded leaves or leaf scars for identification.

	Name	*Plate*
1. Vines	**CLEMATIS, etc.**	**7**
1. Erect plants:		
2. Leaflets 3:		
3. End buds false; all leaves with 3 leaflets	**BLADDERNUT**	**8**
3. End buds true; at least some leaves with 5–7 leaflets	**ASHLEAF MAPLE**	**10**
2. Leaflets 5–11:		
4. Leaves feather-compound:		
5. Shrubs; twigs rarely stout and pithy	**ELDERBERRIES**	**8**
5. Trees; twigs rarely stout and not pithy:		
6. Twigs hairless and not white-powdered	**ASHES (1)**	**9**
6. Twigs either velvety-hairy or white-powdered	**ASHES (2), etc.**	**10**
4. Leaves fan-compound	**BUCKEYES**	**11**

Vines with Opposite Compound Leaves

(*Plate 7, p. 56*)

Few in number, these climbing shrubs are easy to recognize at any time of year. Even in winter, those vines that have shed their opposite simple leaves (Plate 13) cause no confusion, since with the exception of Decumaria (see under Trumpet Creeeper below) they climb by means of twining stems.

PURPLE CLEMATIS *Clematis verticillaris* DC. **p. 56**
Recognition: Only vine climbing by *twining leafstalks.* Leaves divided into 3 egg- to heart-shaped leaflets; occasionally in whorls of 3. Twigs angled. Leaves 3″–7″. Flowers purplish, 2″–3″ across, May–June. Fruits feathery, July–Aug.
Remarks: Genus *Clematis* comprises 14 wild species in our area. Purple Clematis is the most woody; the remainder are not considered shrubby. All have general characteristics of this species, though 5–9 leaflets may occur and blossoms may be white. All have alternate name of Virgin's Bower. Two cultivated woody Asiatic species occasionally escape: *C. orientalis* L., with much divided leaflets and yellow blossoms; and *C. viticella* L., with 3–7 narrow egg-shaped leaflets and pink to purple flowers.

CROSS VINE *Bignonia capreolata* L. **p. 56**
Recognition: Only vine with leaves divided into *2 leaflets and a tendril* and only vine whose stem in cross section shows *a cross.* High-climbing; leaflets *evergreen,* narrowly heart-shaped. Flowers 2″, orange to red, rather bell-like, April–June. Fruits 4″–8″, dry, podlike, containing many small winged seeds, Aug.–Oct.

TRUMPET CREEPER *Campsis radicans* (L.) Seem **p. 56**
Recognition: A vine climbing high by *aerial rootlets* in double rows along twigs. Leaflets *7–11* egg-shaped, toothed. Buds green, smooth. Leaves 3″–12″. Flowers 2″–3″, orange-red, tubular or funnel-shaped, clustered, July–Sept. Fruits 4″–8″, dry, podlike, containing many small winged seeds, Aug.–Oct., or longer.
Similar species: (1) Decumaria (p. 70) also has opposite leaves, aerial rootlets, but barely enters our area in se. Virginia; it has simple leaves and in winter red, hairy buds. (2) See Cross Vine.
Remarks: Sometimes cultivated. Hummingbirds visit blossoms.

Plants with Opposite Compound Leaves

(*Plate 8, p. 58*)

Only these 4 erect shrubs (or small trees) bear opposite feather-compound leaves. Their twigs lack central end buds at the tips. The other nonclimbing plants with opposite compound leaves have true end buds present. Bladdernut and European Elderberry may attain small-tree size but usually are smaller.

BLADDERNUT *Staphylea trifolia* L. **p. 58**

Recognition: A shrub or small tree whose leaves have 3 (rarely 5) fine-toothed, elliptic leaflets. Twigs slender with few small wartlike lenticels or none. Pith white, narrow. Buds brown, 2–4 scaled, small. Leaf scars small, without connecting lines between. Bundle scars 3–7. Bark of older branches greenish or gray streaked with white. Leaves 2″–6″. Height 5′–15′ (25′); diameter 1″–2″ (6″). Flowers whitish, clustered, drooping, April–June. Fruits inflated papery capsules, 1″–2″, Aug.–Oct.
Similar species: No other woody species has such fruits. The only opposite-leaved shrub with all leaflets usually in 3's. Ashes and Ashleaf Maple (p. 51) may have some 3-parted leaves but normally leaves with 5–11 leaflets are present.

COMMON ELDERBERRY *Sambucus canadensis* L. **p. 58**

Recognition: A shrub with large leaves composed of 5–11 coarse-toothed, elliptic leaflets. Twigs stout with *large white pith.* Small wartlike lenticels common. Leaf scars large, with connecting lines between; 5–7 bundle scars. Buds small, green or brown. Bark brownish. Leaves 4″–11″. Height 3′–13′; diameter ¾″–1″ (3″). Flowers small, white, in dense *flat-topped* clusters, June–July. Fruits small (mostly less than 3⁄16″ in diameter), juicy, *purple-black,* rarely bright red, yellow, or orange, Aug.–Oct.
Similar species: (1) Red Elderberry, more of a forest species, has brown pith, larger purplish buds and cone-shaped heads of red fruits. (2) European Elderberry has larger fruits, may grow to tree size.
Remarks: All parts of plant reported to yield hydrocyanic acid. Regardless, fruits are used in making jam, jelly, wine, pies. Ripe fruits are eaten by 43 species of birds, including pheasant, mourning dove, and wild turkey.

EUROPEAN ELDERBERRY *Sambucus nigra* L. **Not illus.**

Recognition: Similar to Common Elderberry but branchlets have more numerous lenticels. Leaflets mostly 5–7. Fruits shiny black, ¼″–5⁄16″ across. Plant grows to 30′. European; occasionally escaped from cultivation; New England to Virginia.

RED ELDERBERRY *Sambucus pubens* Michx. **p. 58**
Recognition: Like Common Elderberry but with *brown* pith, larger purplish buds, 5–7 leaflets, and *cone-shaped* flower and fruit clusters. Flowers April–July. Fruits *brilliant red* or (uncommonly) white or yellow, June–Sept.

Trees with Opposite Feather-compound Leaves: Ashes, Ashleaf Maple, and Corktree

(Plates 9 and 10, pp. 60, 62)

The ashes and the Ashleaf Maple, or Box Elder, are our only native trees with opposite feather-compound leaves. All are tall trees. Young trees may be distinguished from shrubs with similar leaves by the presence of true end buds. These are lacking in the shrubby species (see Plate 8). In winter, ashes are the only plants having: 4 or more bundle scars per leaf scar, central end buds present (but not exceptionally large), and opposing leaf scars that do not meet. At that season, Ashleaf Maple has green or purplish, smooth, hairless, often white-powdered, twigs whose opposite leaf scars meet at raised points. See Japanese Corktree (p. 52).

Identification of ash species is never simple except for a few well-marked forms. If the winged fruits, which look like the blades of canoe paddles, are present they may be useful. The leaflets may be variably toothed or not within a single species (except as noted, Plates 9-10). Though found most frequently as shown in the drawings, slight variations from this shape are common. Usually the twigs of the 3 hairy types are obviously velvety; only rarely is it necessary to use a lens. The flowers are dark, clustered but without petals and inconspicuous. Leaf scars are large, shield-shaped, with numerous bundle scars; buds have a somewhat granular surface texture.

The ashes yield quality lumber for furniture, tool handles, baseball bats, baskets, and many special purposes. The twigs serve as deer food; the flowers provide pollen for bees. Indians once made a dark bitter sugar from the sap.

BLUE ASH *Fraxinus quadrangulata* Michx. **p. 60**
Recognition: A tree of high ground with vigorous twigs often *square* in cross section. Twigs hairless, with long lines leading from leaf scars. Leaflets 7–11, green beneath, stalked and

always toothed. Upper edges of leaf scars only shallowly notched. Trunk bark whitish and somewhat scaly. Leaves 8″–12″. Height 60′–70′ (115′); diameter 2′–3′ (3½′). Flowers April–May. Fruits with *broad squared tips,* June–Oct.

Similar species: No other opposite-leaved plant has such squarish twigs and shield-shaped leaf scars. Where twigs are not sharply angled, the long lines along them are distinctive.

Remarks: Inner bark yields a blue dye.

WHITE ASH *Fraxinus americana* L. **pp.** *7,* **60**

Recognition: An upland tree with twigs that have the brown side buds usually set in deep *U- or V-shaped notches* in upper edges of leaf scars. Twigs round and hairless. Leaflets 5–9, stalked (sometimes short-stalked), usually *white* or pale beneath and either toothed or not. Trunk bark rather dark and tight with rigid interwoven pattern of shallow ridges and furrows. Leaves 8″–12″. Height 70′–80′ (100′); diameter 2′–3′ (7′). Flowers April–June. Fruits *narrow,* Oct.–Nov.

Similar species: When present. very deeply notched leaf scars are a good field mark among ashes with hairless twigs. Unfortunately, there is some variation in depth of notch in this and other species. Doubtful cases must be identified by fruits. Biltmore Ash, a variety, has hairy twigs.

Remarks: Most valuable and largest native ash, providing hard, strong, durable timber for furniture, interior decorating, agricultural implements, tool handles, oars, tennis rackets, musical instruments, baseball bats, snowshoes, and skis. As a campfire fuel, it ranks with oak and hickory.

BLACK ASH *Fraxinus nigra* Marsh. **p. 60**

Recognition: A tree of swamps and bottomlands whose leaflets are *not stalked.* The 7–11 leaflets always toothed. Twigs round, hairless, rather dull. Leaf scars not deeply notched. Buds *very dark,* nearly black. Trunk bark generally rather tight and furrowed but may be somewhat scaly. Leaves 12″–16″. Height 40′–80′; diameter 1′–2′. Flowers April–May. Fruits *blunt at both ends,* June–Sept.

Similar species: Both (1) White and (2) Green Ashes may have short-stalked leaflets but they lack dark buds and blunt fruits of this species.

Remarks: Known also as Hoop or Basket Ash. Short logs or planks when hammered repeatedly on the ends split along the annual growth rings into thin sheets that can be cut into strips for weaving pack baskets, chair seats, barrel hoops, etc. Knotty burls of the trunk are made into veneers and furniture.

GREEN ASH **p. 60**
Fraxinus pennsylvanica var. *subintegerrima* (Vahl) Fern.

Recognition: A lowland tree whose leaflets are stalked (some-

times short-stalked. Leaflets 5–9, green on both sides, toothed or not. Twigs hairless, mostly *shiny* and buds *brownish*. Trunk bark tight and closely furrowed. Leaves 10″–12″. Height 60′–70′; diameter 2′–3′ (4′). Flowers April–May. Fruits wedge-shaped, Sept.–Oct.
Similar species: A hairless variety of (1) Red Ash; intermediate specimens occur. (2) See also Black Ash. (3) Water Ash may have hairless twigs but has scaly bark, wider fruit, usually swollen trunk base.

Plate 10

(*p. 62*)

RED ASH *Fraxinus pennsylvanica* Marsh. **p. 62**
Recognition: A tree of low grounds with *velvety-hairy* twigs and leafstalks. Leaflets 5–9, stalked, green on both sides, toothed or not. Twigs gray or brownish. Trunk bark tight, furrowed, with inner surface of outer bark reddish. Trunk base not swollen. Leaves 10″–12″. Height 40′–60′ (85′); diameter 2′–3′ (4′). Flowers April–May. Fruits with long *tapering seeds*, Sept.–Oct.
Similar species: (1) Forms intermediate with its variety the Green Ash may occur. (2) Biltmore Ash has leaflets whitened beneath. (3) Pumpkin and (4) Water Ashes have swollen trunk bases and often grow in standing water. Water Ash barely enters our area.

BILTMORE ASH **p. 62**
Fraxinus americana var. *biltmoreana* (Beadle) J. Wright
Recognition: Similar to Red Ash but with leaflets *whitened beneath*, inner bark surface not reddish and fruit seeds *stout* and *blunt*. Leaf scars not notched (see related White Ash).

PUMPKIN ASH *Fraxinus tomentosa* Michx. f. **p. 62**
Recognition: A small to large tree of swamps and bottomlands, with *velvety-hairy* twigs and leafstalks. The leaves are *large, shiny above*, and sometimes leathery. The 7–9 *long-pointed* leaflets are *not toothed* but are sometimes wavy-edged; they vary from red-brown hairy to nearly hairless beneath. Trunk bark is tight (with shallow furrows) to somewhat scaly. Trunk base usually swollen on wet sites. Leaves 4″–18″. Height to 125′. Flowers April–May. Fruits *long*, 1½″–3″, seeds not stout, Sept.–Oct.
Similar species: Water Ash is strictly southern and its leaves are neither leathery nor rusty-hairy and are more likely to be toothed.

WATER ASH **Fruit illus., p. 62**
Fraxinus caroliniana Mill.

Recognition: A small tree of *southern swamps* with twigs usually *velvety-hairy.* Leaflets and twigs generally as in Red Ash, but may be hairless in this species. Trunk bark tight and somewhat scaly. Trunk base usually *swollen* when growing in water. Leaves 7″–12″. Height to 35′; diameter 10″–12″. Flowers April–May. Fruits to 2″; broad-winged with narrow bases. **Similar species:** See under (1) Red Ash and (2) Green Ash.

ASHLEAF MAPLE (BOX ELDER) *Acer negundo* L. **p. 62**

Recognition: A medium-sized tree of moist fertile soils with green or purplish, glossy, frequently white-powdered or, rarely, slightly hairy twigs. Leaflets 3–5 (uncommonly 7) with few coarse teeth or none. End leaflet often 3-pointed and somewhat *lobed.* Narrow leaf scars *meet in raised points* on opposite sides of twigs. Bundle scars 3 (or 5); buds white-hairy. Trunk bark furrowed. Leaves 4″–10″. Height 50′–75′; diameter 2′–4′. Flowers April–May. Fruits paired "keys," Sept.–Oct.

Similar species: Only ashlike tree with leaf scars meeting in raised points. (1) When only 3 leaflets present, they often resemble those of Poison-ivy (Plate 25), whose leaves are alternate. (2) Other maples (Plate 22) have simple leaves and dissimilar winter characteristics.

Remarks: Box Elder, a widely used common name, fails to indicate proper relationships. Soft white wood is used for boxes, etc. Syrup can be made from the sap. Squirrels and songbirds eat the seeds.

JAPANESE CORKTREE **Not. illus.**
Phellodendron japonicum Maxim.

Recognition: Oriental; occasionally escapes to the wild. Identified easily as the only upland nonclimbing plant with *toothless leaflets* among those with opposite compound leaves. Leaflets 5–13, egg- to heart-shaped, white-hairy beneath, with long tips. Twigs reddish, with buds small, hairy, with 2 obscure scales and hidden beneath base of leafstalk. Leaf scars deeply U-shaped, with 3 groups of bundle scars; partially enclosing bud. Height to 35′. Flowers small, greenish, clustered, May–July. Fruits black, fleshy, 5-seeded, Sept.–Oct.

Trees with Opposite Fan-compound Leaves: Buckeyes

(*Plate 11, p. 64*)

Buckeyes are the only plants with opposite leaves whose leaflets are arranged like spokes of a wheel. In winter, a combination of characteristics will identify the group: leaf scars have 5 or more bundle scars, twigs and end buds are large, and side buds have 4 or more pairs of scales. The flowers are in large showy upright spikes and the fruits have 3-parted husks that contain 1–3 large shiny brown nuts.

The native Ohio and Sweet Buckeyes may be large and important trees in forests west of the Appalachian Mountains. There they are sometimes dominant with the White Oak in the few areas of virgin timber remaining. Hybrids are known. To the eastward an imported relative, the Horsechestnut, common in shade-tree plantings, occasionally escapes to grow wild.

Seeds, young twigs, and leaves of all buckeyes sometimes are toxic to livestock. Crushed fruits and branches have been used to kill fish for food but this practice is now illegal.

HORSECHESTNUT *Aesculus hippocastanum* L. **p. 64**

Recognition: A large imported tree with 7–9 wedge-shaped toothed leaflets. End buds large, very *sticky*. Broken twigs have no decidedly disagreeable odor. Trunk bark somewhat scaly. Leaves 4″–15″. Height 60′–75′ (80′); diameter 1′–2′ (3′). Flowers white, May. Fruits with *strongly thorny husks*, Sept.–Oct.

Similar species: Only buckeye with sticky end buds and strongly thorny fruit husks. The chestnuts (Plate 57) have large brown nuts but are otherwise dissimilar.

SWEET BUCKEYE *Aesculus octandra* Marsh. **p. 64**

Recognition: Similar to Horsechestnut but with usually 5 (4–7) leaflets and *nonsticky* buds. Bud scales not ridged. Trunk bark fairly smooth or broken with large plates. The rare form *vestita* (Sarg.) Fern. has leaves hairy beneath. Leaves 4″–15″. Height to 90′; diameter to 3′. Flowers yellow, bell-shaped, May–June. Fruits with *smooth husks*, Sept.–Oct.

Similar species: Ohio Buckeye has ridged end-bud scales.

Remarks: Fruits, unlike those of other buckeyes, sometimes are eaten by cattle and hogs. They are said also to make an excellent paste when powdered and mixed with water. Wood is light and tough.

OHIO BUCKEYE *Aesculus glabra* Willd. **p. 64**

Recognition: A smaller tree than Sweet Buckeye and with prominently *ridged* bud scales on end buds. Twigs emit a *foul odor* when broken. Trunk bark scaly. Leaflets may be hairy in forma *pallida* (K. Koch) Fern., or unusually narrow and long-pointed in var. *sargentii* Rehd. Var. *leucodermis* Sarg. has whitened bark and leaf undersides. Leaves 4″–15″. Height to 40′; diameter to 2′. Flowers yellow, bell-shaped, April–May. Fruit husks with *weak thorns*, fruits Sept.–Oct.

Similar species: (1) Sweet Buckeye has scales of end buds not ridged. (2) Dwarf Buckeye has fruit husks without prickles.

DWARF BUCKEYE *Aesculus sylvatica* Bartr. **Not. illus.**
Recognition: A thicket-forming shrub barely entering our area. Flowers *bell-shaped* like Ohio Buckeye and unlike next 2 species; they are yellow or cream-colored. Leaves 5-parted and fruits *not prickly.* Mostly Coastal Plain and Piedmont Plateau bottomlands; se. Virginia to Florida and Alabama.

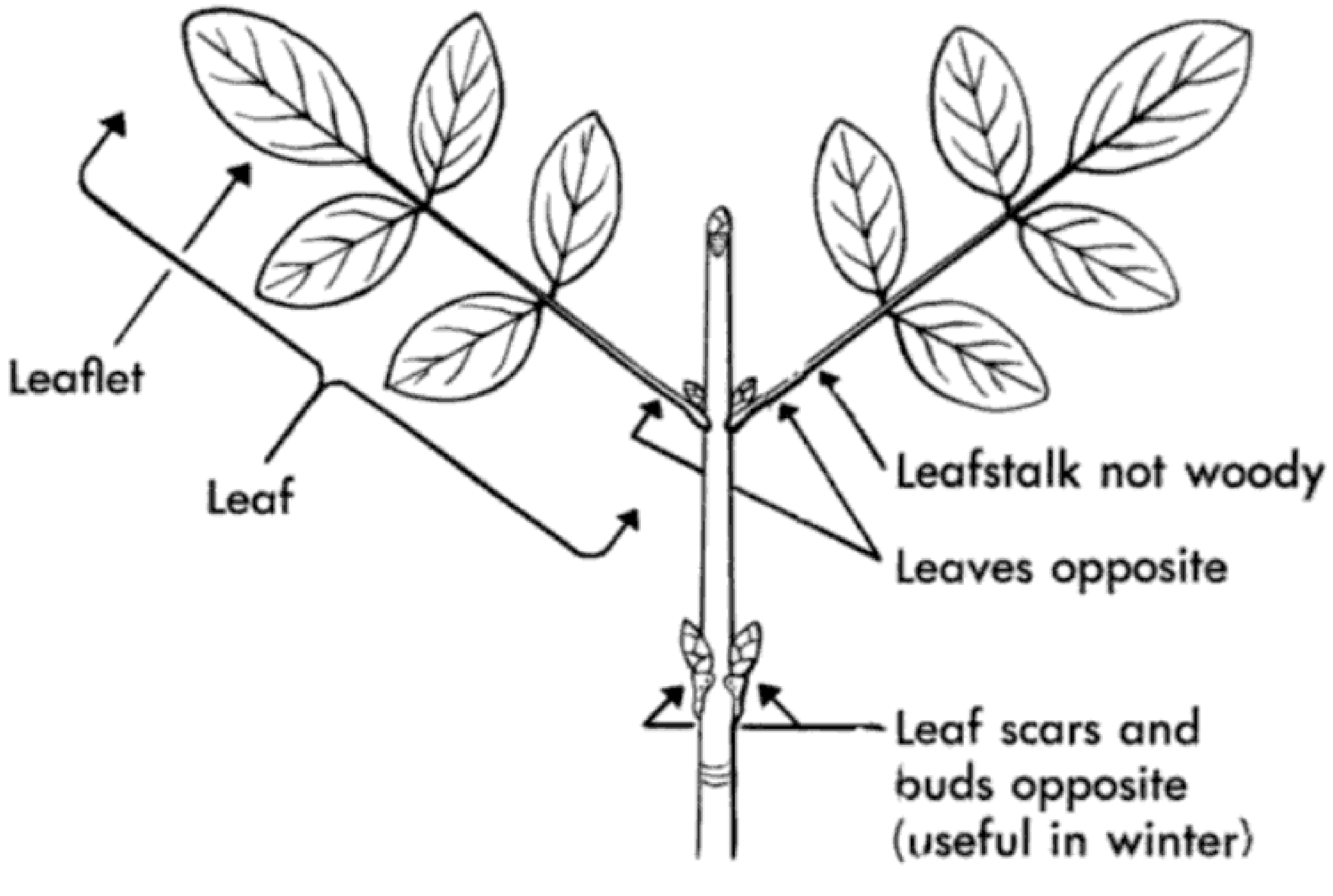
RED BUCKEYE *Aesculus pavia* L. **Not. illus.**
Recognition: A shrub or small tree with 5 leaflets that are narrow to elliptic and hairless when mature. Flowers bright red and tubular, the stamens hidden within tube unlike preceding buckeyes. Fruits not prickly. Coastal Plain woods; se. Virginia to Florida, west to centr. Texas, and north in Mississippi Valley to s. Illinois, se. Missouri, and se. Oklahoma.

PARTICOLORED BUCKEYE **Not illus.**
Aesculus discolor Pursh
Recognition: Similar to Red Buckeye and considered by some botanists to be synonymous with it. Leaflets *broader and hairy beneath.* Flowers red, yellow-green, or both. Woods; N. Carolina, Kentucky, and Missouri to Georgia and Texas.

PLATES FOR SECTION II

Broad-leaved Plants with Opposite Compound Leaves

(*Key, page 46; text, pages 46–54*)



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Some alternate-leaved plants bear stubby, scarred, leaf-crowded spur branches. Care should be taken that their leaves and leaf scars are not assumed to be opposite or whorled because of this crowding. None of the plants in our area with true opposite or whorled leaf scars ever develop spur branches. Twigs with uncrowded leaves or leaf scars should be selected for identification.

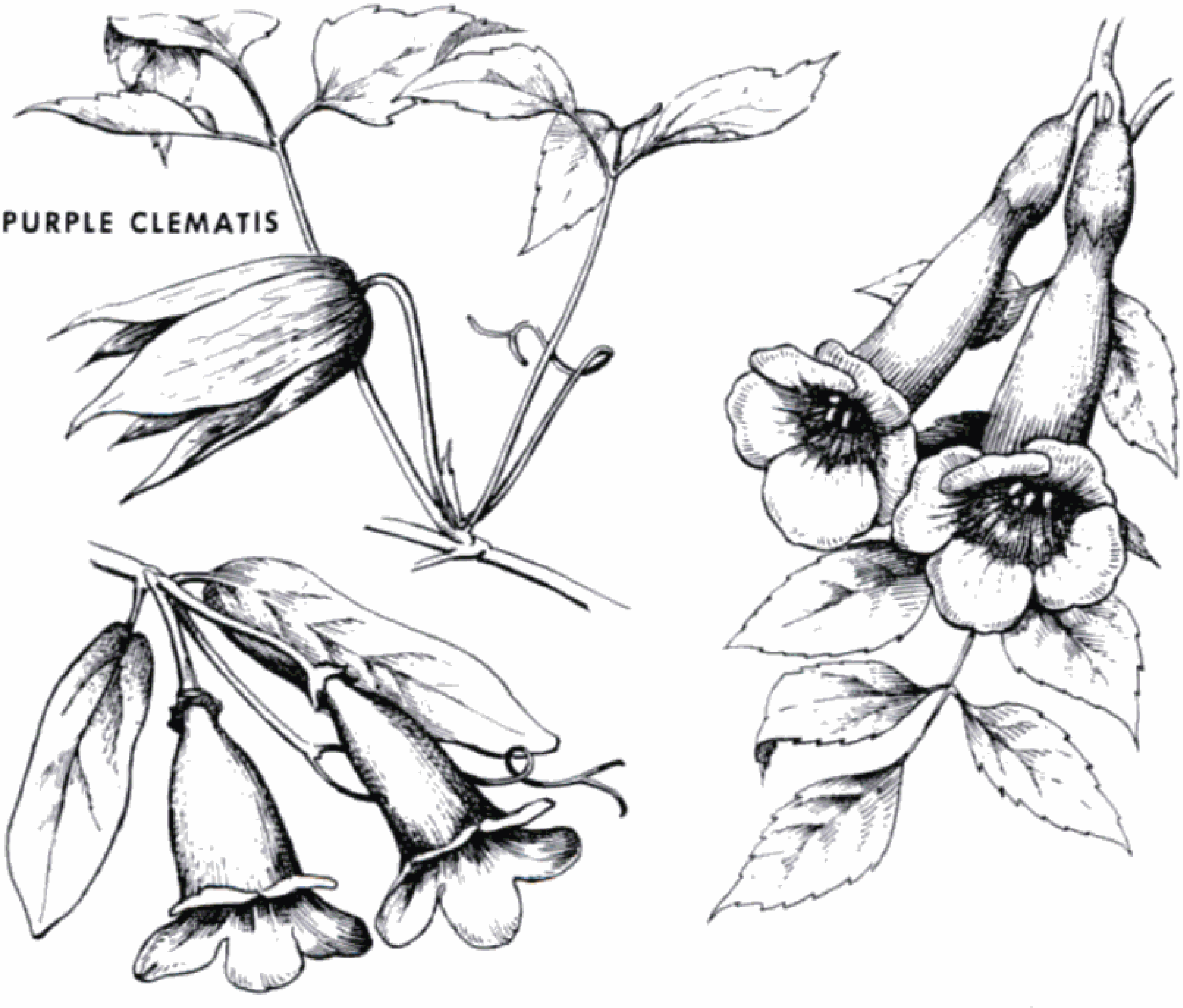
VINES WITH OPPOSITE COMPOUND LEAVES

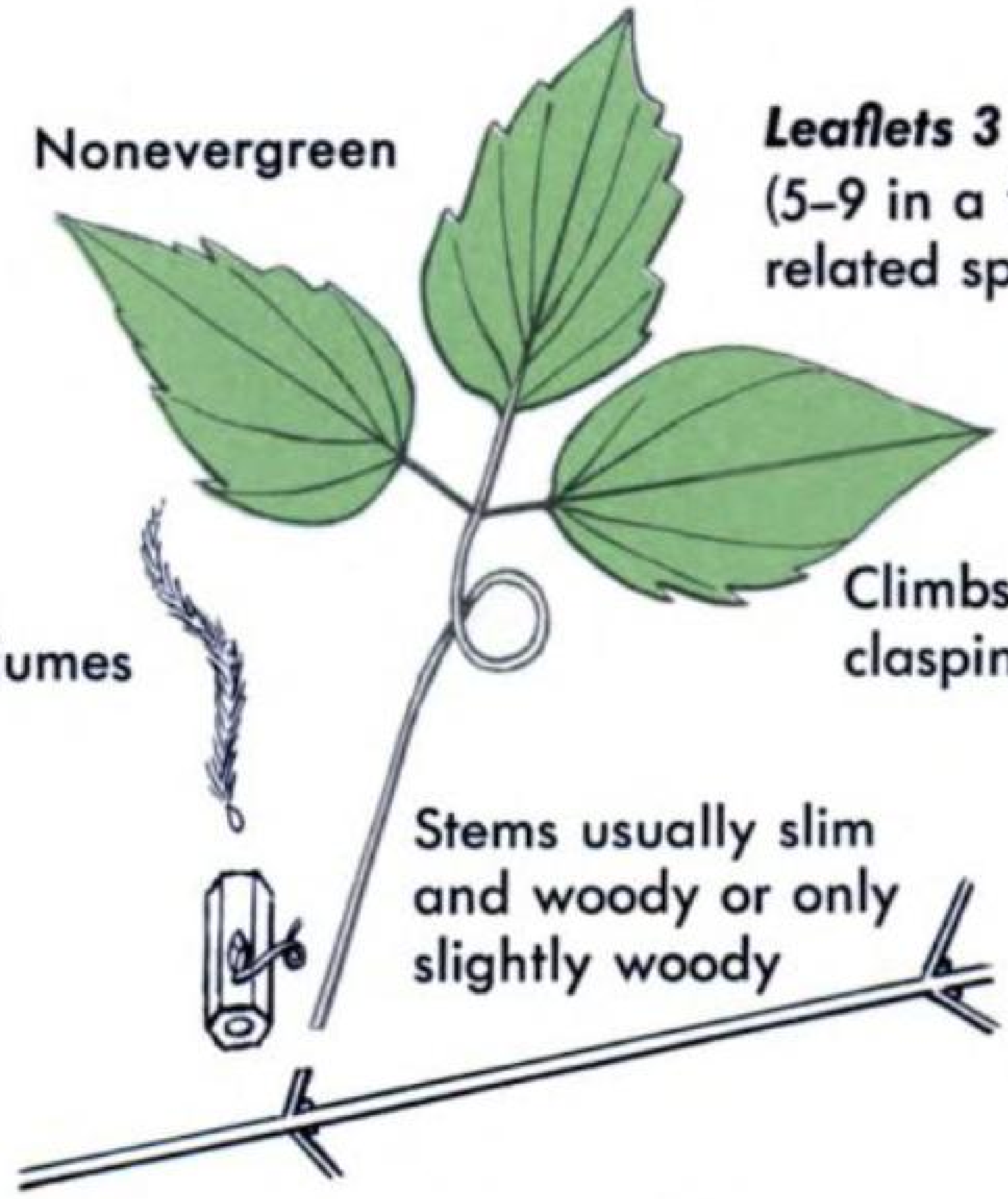
All other vines have either alternate compound leaves or simple leaves.

ʃ PURPLE CLEMATIS, *Clematis verticillaris* p. 47
Woods and rocky places; e. Quebec and Manitoba to Delaware, W. Virginia, Michigan, and ne. Iowa.

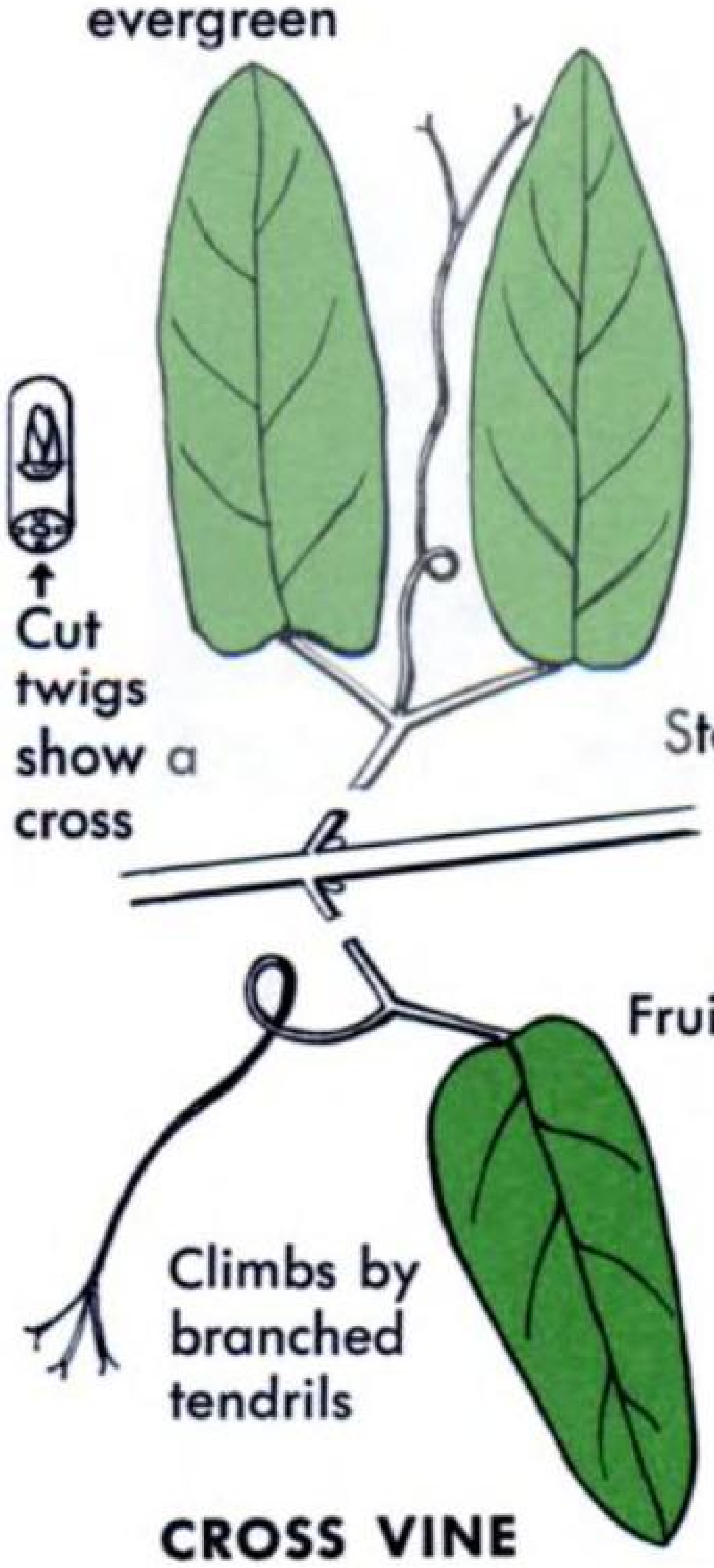
ʃ CROSS VINE, *Bignonia capreolata* p. 47
Floodplains and swamp forests; e. Maryland, W. Virginia, s. Ohio, Indiana, Illinois, and Missouri.

ʃ TRUMPET CREEPER, *Campsis radicans* p. 47
Thickets; Connecticut, e. Pennsylvania, W. Virginia, Michigan, and se. Iowa to Florida and Texas.

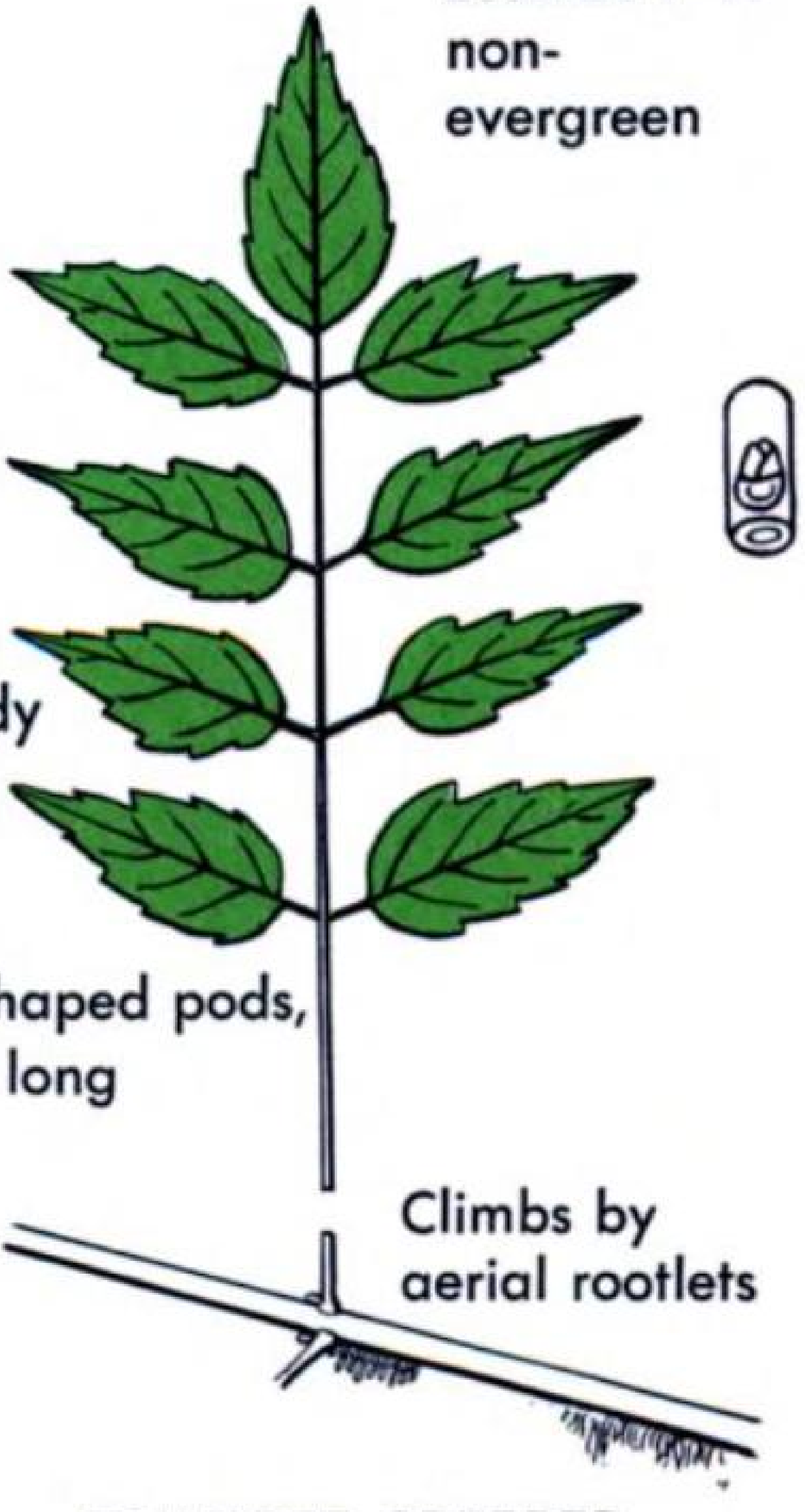



Nonevergreen
Leaflets 3
(5–9 in a few related species)
Fruits small, with long plumes
Climbs by clasping leafstalks
Stems usually slim and woody or only slightly woody

PURPLE CLEMATIS


Leaflets 2
evergreen
Cut twigs show a cross
Stems woody
Climbs by branched tendrils

CROSS VINE


Leaflets 7–11
non-evergreen
Fruits cigar-shaped pods, 4″–8″ long
Climbs by aerial rootlets

TRUMPET CREEPER

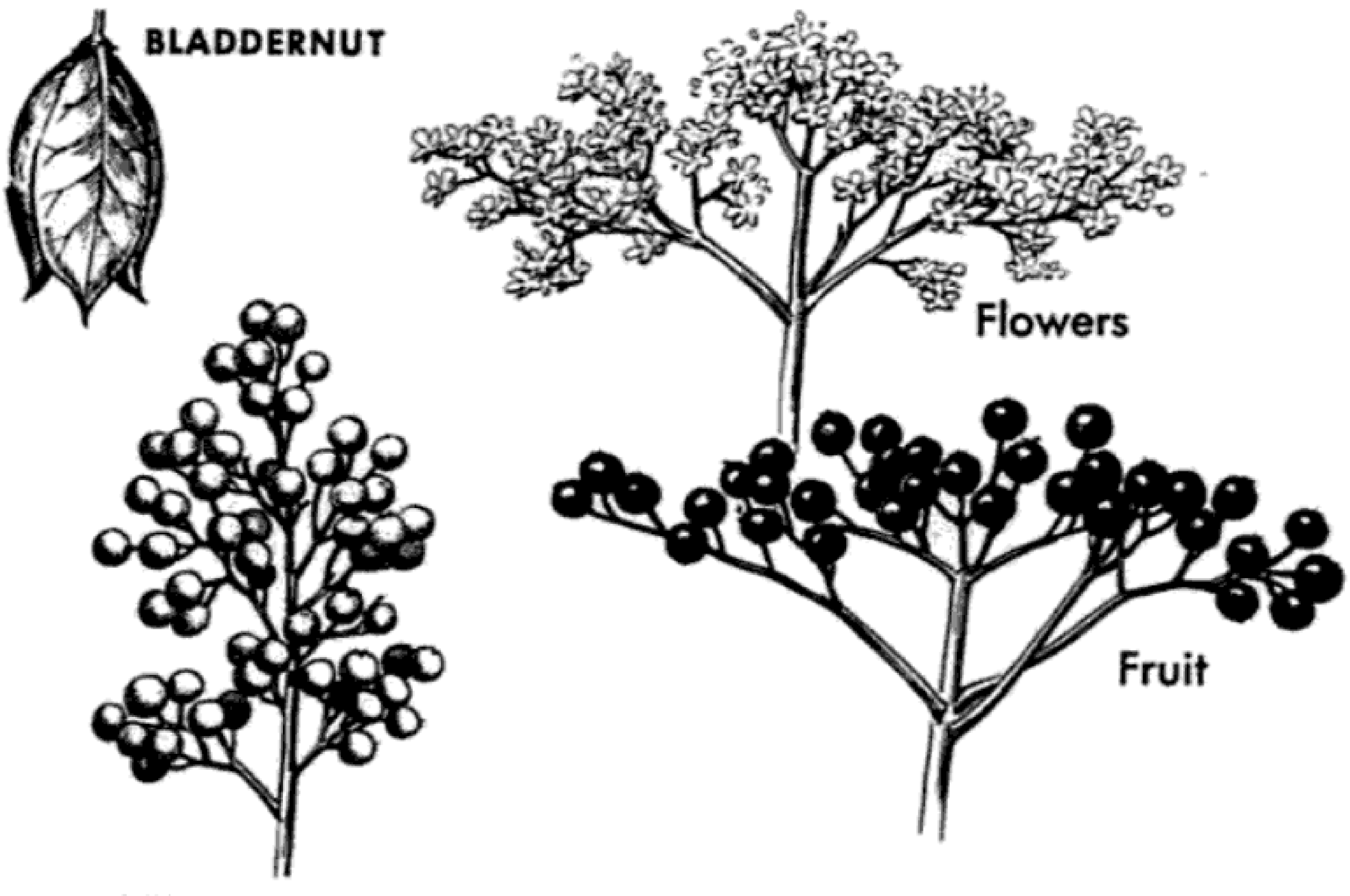
PLANTS WITH OPPOSITE COMPOUND LEAVES

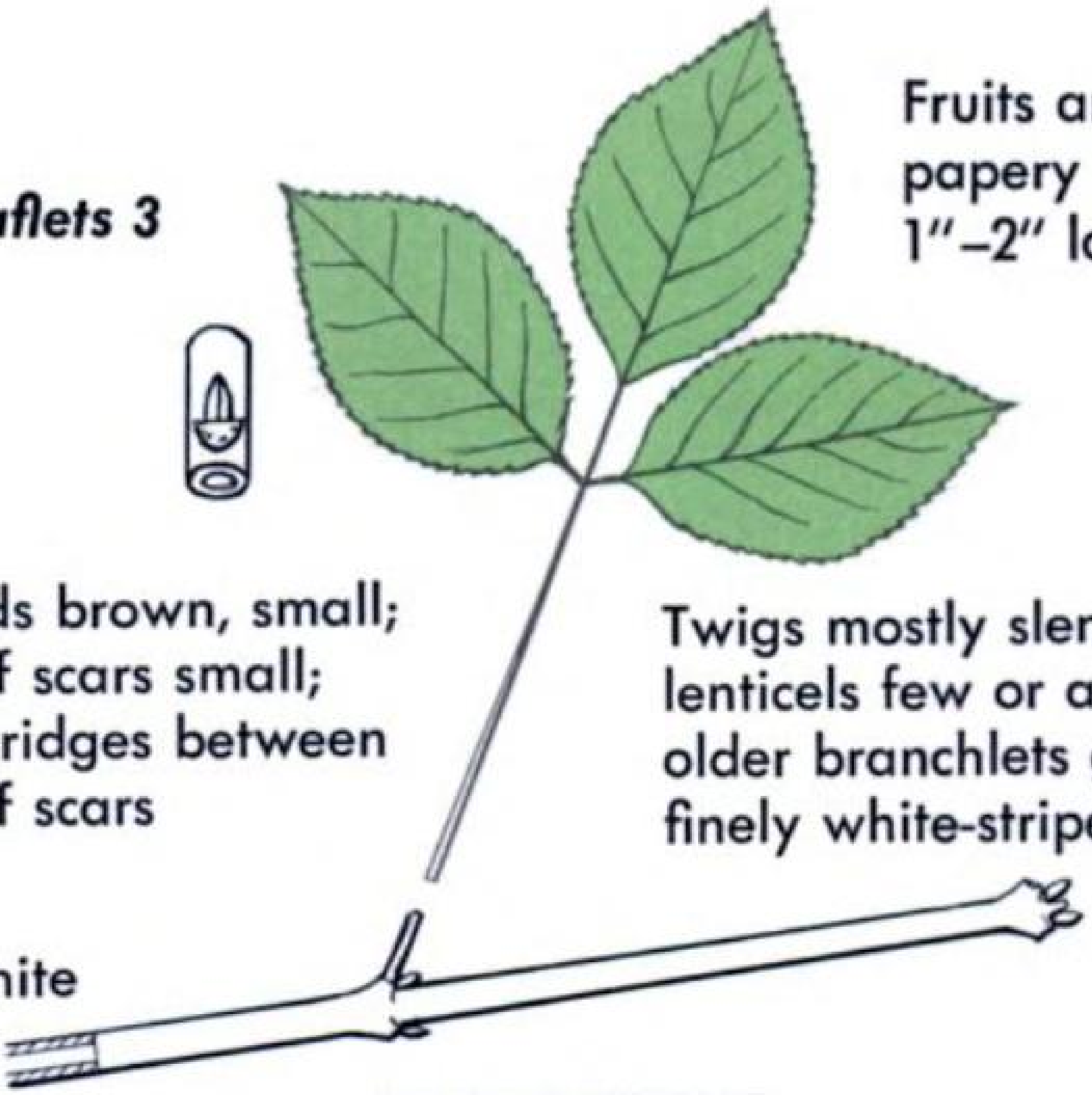
The only upright shrubs (or small trees) with paired, feather-compound leaves.

↑V BLADDERNUT, *Staphylea trifolia* p. 48
Bottomlands and fertile soils; Massachusetts, sw. Quebec, s. Ontario, n. Michigan, and s. Minnesota to Georgia, Alabama, se. Oklahoma, and se. Nebraska.

V COMMON ELDERBERRY, *Sambucus canadensis* p. 48
Thickets; Nova Scotia and Manitoba to Georgia and Texas.
↑V EUROPEAN ELDERBERRY, *S. nigra* (not illus.) p. 48
European; occasional escape from New England to Virginia.

V RED ELDERBERRY, *Sambucus pubens* p. 49
Forest openings; Newfoundland and Alaska to New Jersey, W. Virginia, Illinois, ne. Iowa, Colorado, and Oregon; in Appalachians to Georgia.





Leaflets 3

Fruits are inflated, papery balloons 1″–2″ long

Buds brown, small; leaf scars small; no ridges between leaf scars

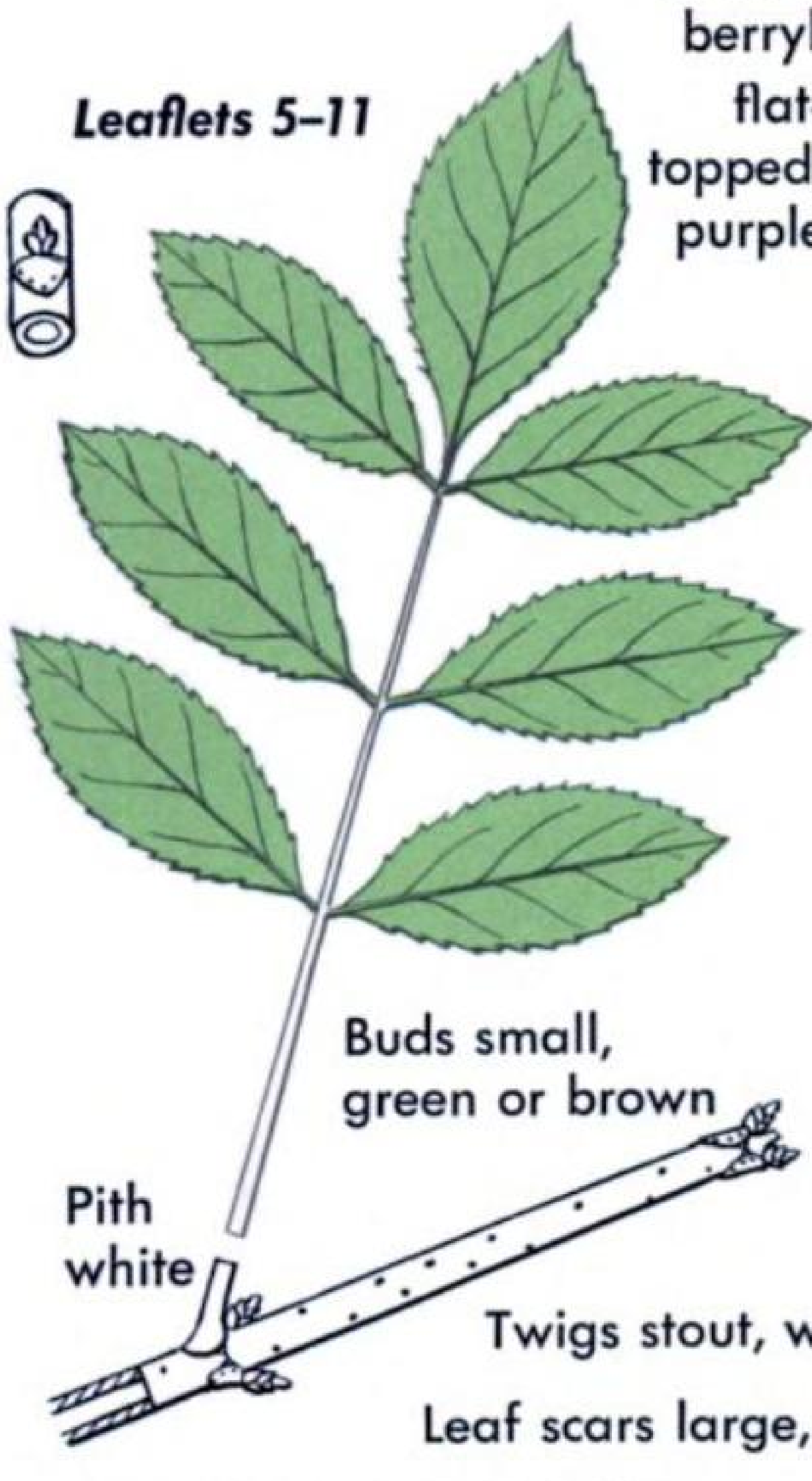
Twigs mostly slender; lenticels few or absent; older branchlets gray, finely white-striped

Pith white

BLADDERNUT

Clusters of small berrylike fruits

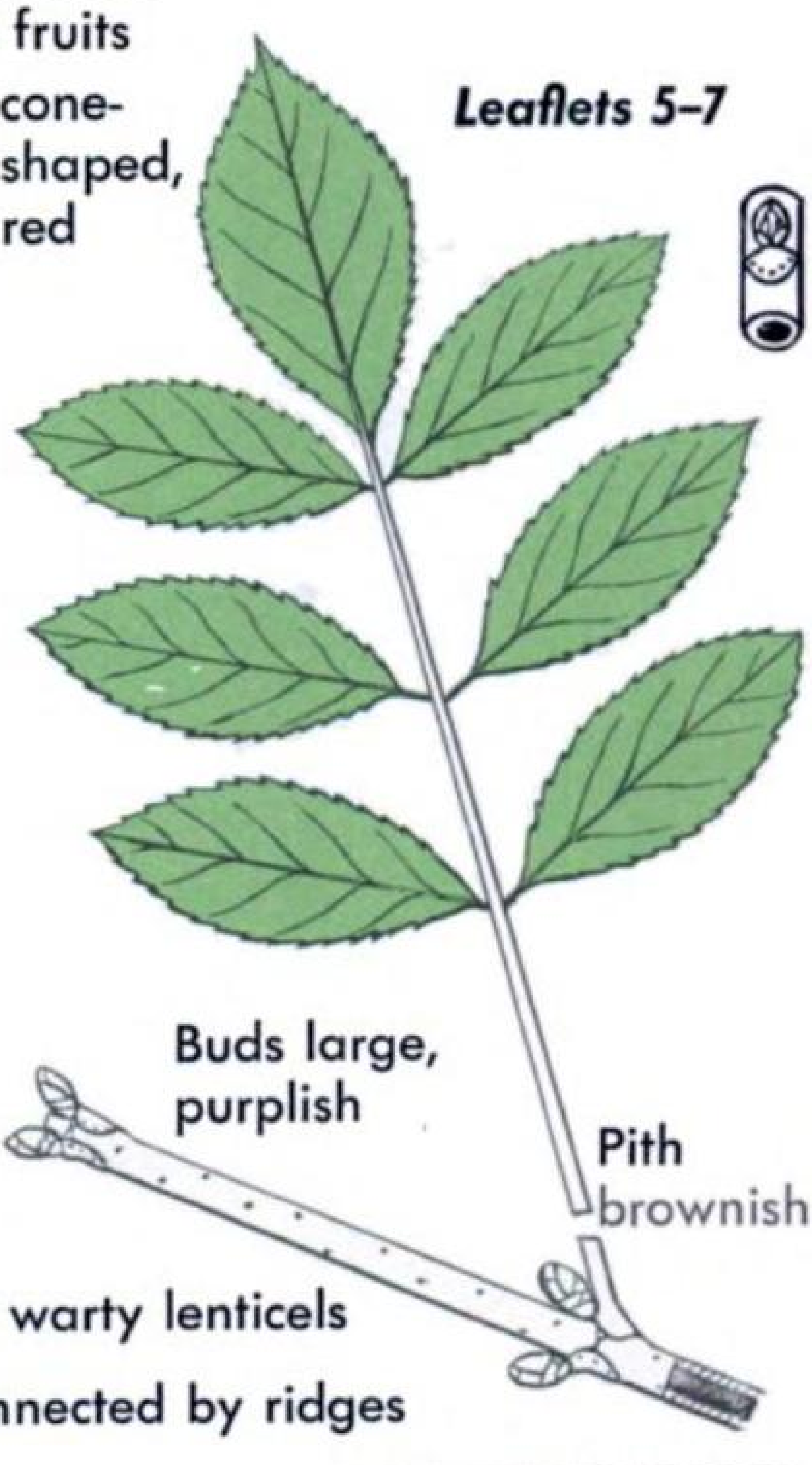
flat-topped, purple	cone-shaped, red



Leaflets 5–11

Buds small, green or brown

Pith white



Leaflets 5–7

Buds large, purplish

Pith brownish

Twigs stout, with warty lenticels

Leaf scars large, connected by ridges

COMMON ELDERBERRY

RED ELDERBERRY

ASHES (1)

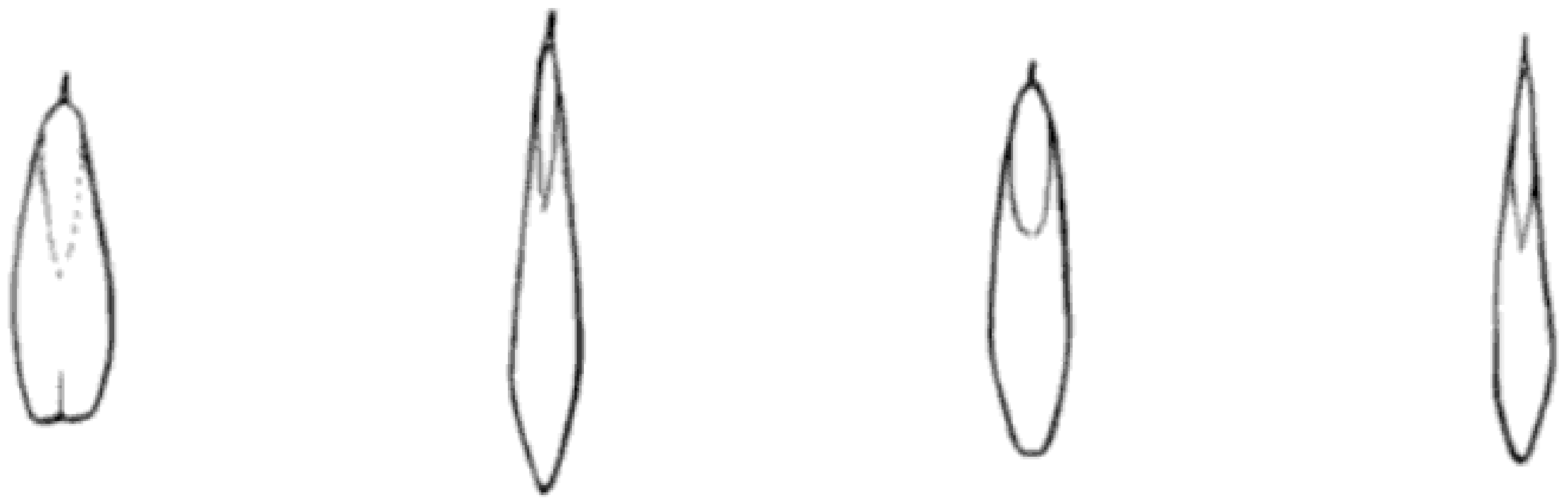
The ashes (and Ashleaf Maple and Japanese Corktree, see also Plate 10) are our only trees with opposite feather-compound leaves. The following 4 species have twigs that are neither velvety nor white-powdered.

♠ BLUE ASH, *Fraxinus quadrangulata* p. 49
Upland woods; s. Ontario and s. Wisconsin to W. Virginia, Alabama, Arkansas, and ne. Oklahoma.

♠ WHITE ASH, *Fraxinus americana* p. 50
Upland forests; Nova Scotia, s. Quebec, s. Ontario, n. Michigan, and se. Minnesota to Florida and e. Texas.

♠ BLACK ASH, *Fraxinus nigra* p. 50
Floodplains and swamps; Newfoundland and Manitoba to n. Virginia, W. Virginia, Illinois, Iowa, and ne. N. Dakota.

♠ GREEN ASH p. 50
Fraxinus pennsylvanica var. *subintegerrima*
Streambanks and floodplains; Nova Scotia, Quebec, s. Ontario, Saskatchewan, and se. Alberta to Georgia and Texas.



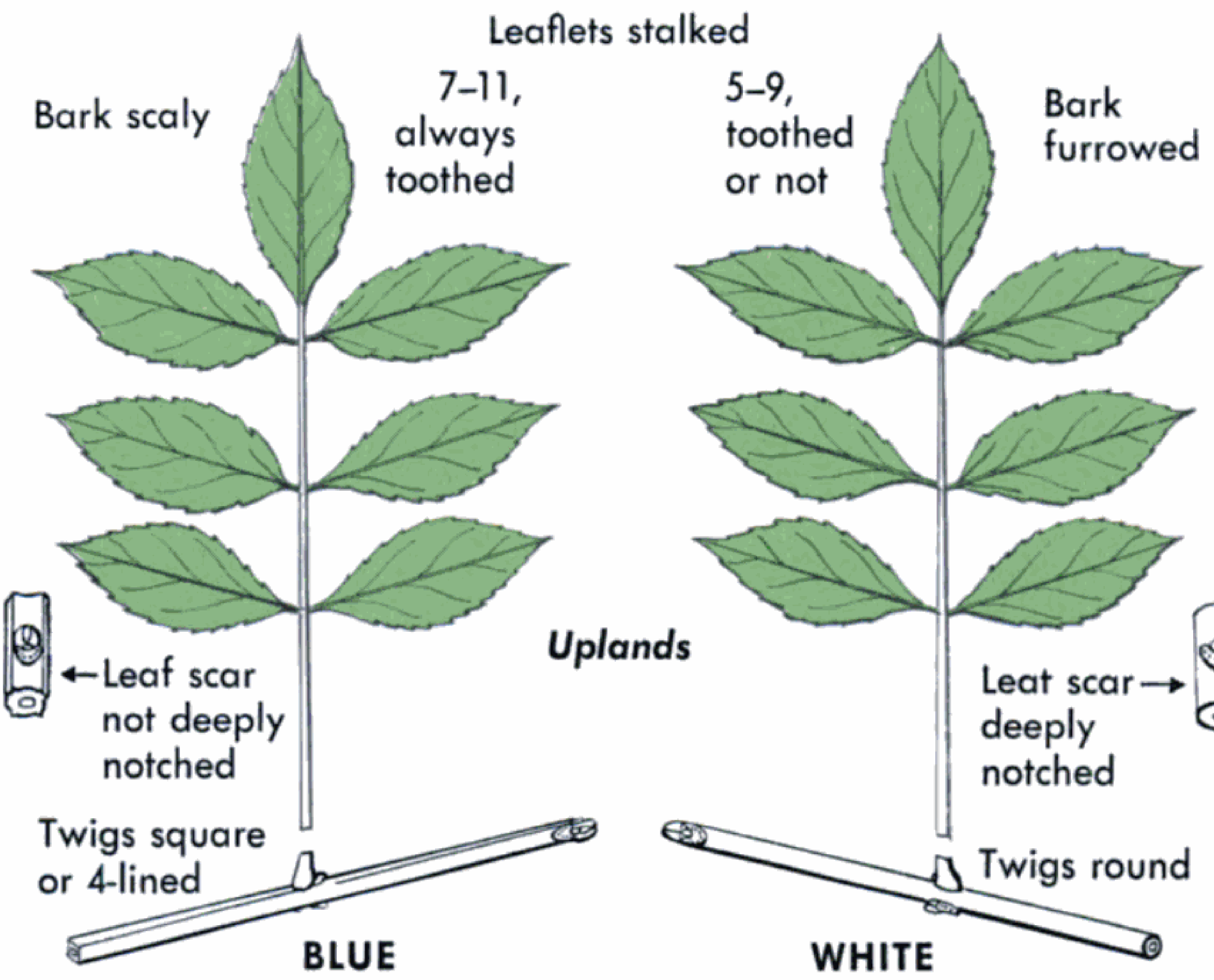
BLUE (Square or notched tip)

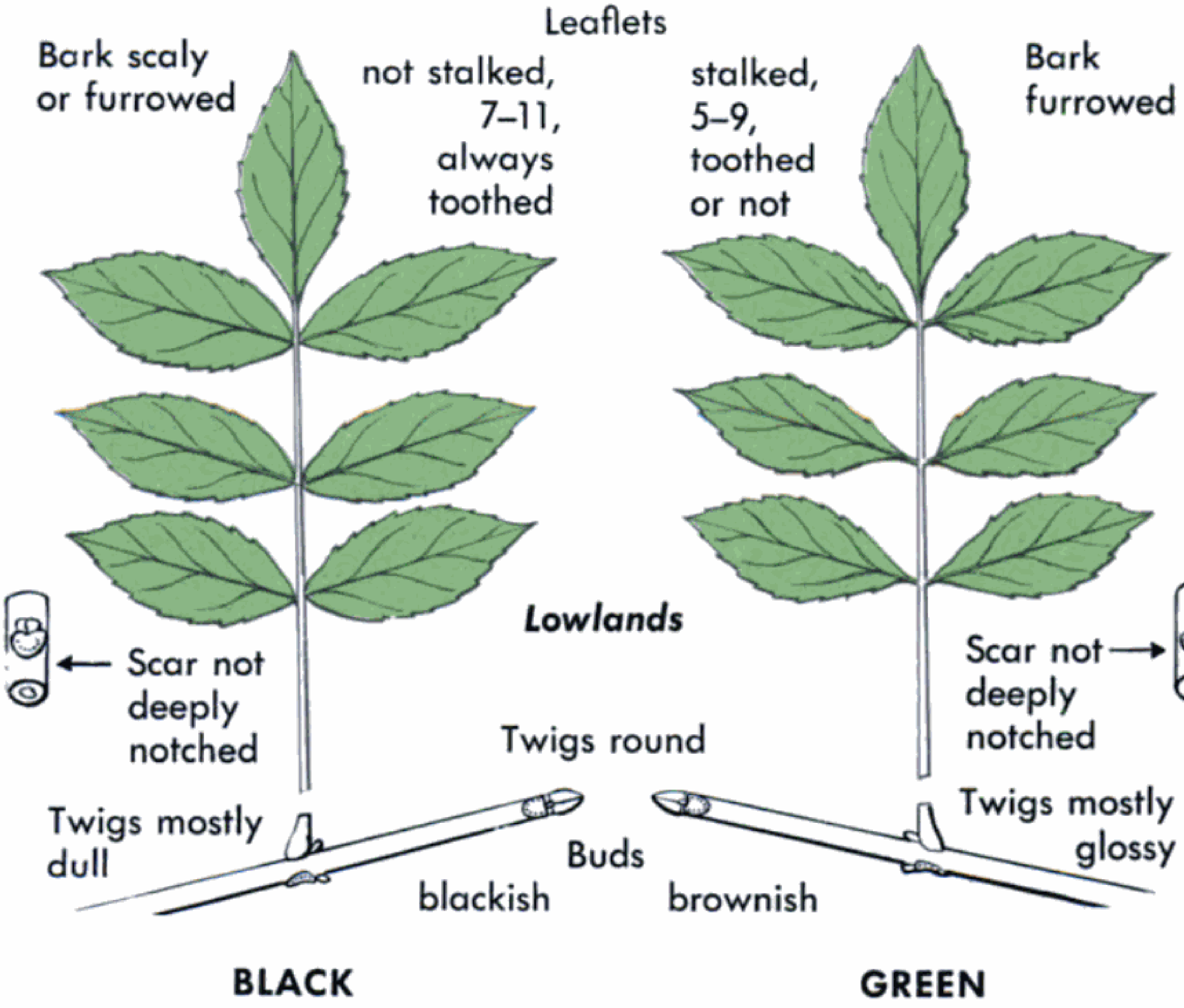
WHITE (Pointed at both ends)

BLACK (Blunt at both ends)

GREEN (Wedge-shaped)

FRUITS OF ASHES


Leaflets stalked
Bark scaly
7–11, always toothed
5–9, toothed or not
Bark furrowed
Leaf scar not deeply notched
Uplands
Leaf scar deeply notched
Twigs square or 4-lined
Twigs round
BLUE
WHITE


Leaflets
Bark scaly or furrowed
not stalked, 7–11, always toothed
stalked, 5–9, toothed or not
Bark furrowed
Lowlands
Scar not deeply notched
Scar not deeply notched
Twigs round
Twigs mostly dull
Twigs mostly glossy
Buds
blackish
brownish
BLACK
GREEN

ASHES (2) AND ASHLEAF MAPLE, ETC.

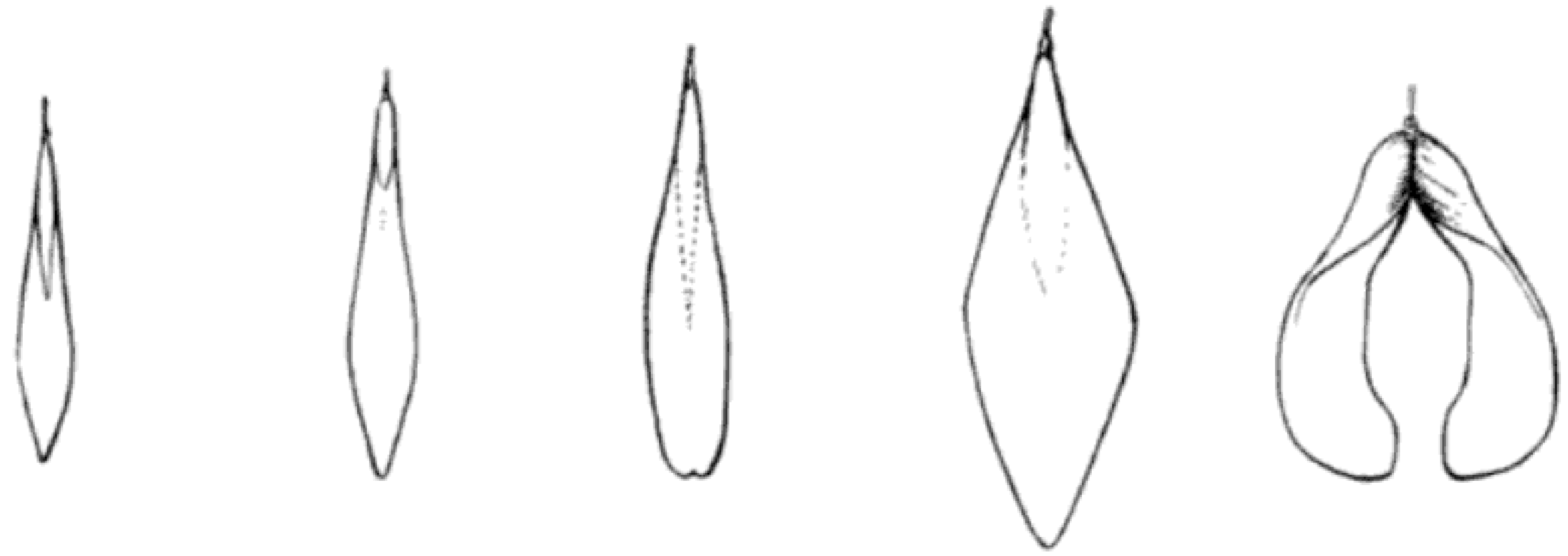
The only trees with opposite feather-compound leaves (see also Plate 9). The species of this group have velvety-hairy or bright green and usually white-powdered round twigs.

↟ RED ASH, *Fraxinus pennsylvanica* p. 51
Damp soils; sw. Quebec and s. Ontario and Manitoba to Alabama, Louisiana, and Iowa.

↟ BILTMORE ASH p. 51
Fraxinus americana var. *biltmoreana*
Woods; New Jersey, s. Illinois, and Missouri to Georgia and Alabama.

↟ PUMPKIN ASH, *Fraxinus tomentosa* p. 51
Floodplains and swamps; se. and sw. New York to nw. Florida and Louisiana.
↟ WATER ASH, *F. caroliniana* (fruit illus.) p. 52
Coastal Plain swamps and shorelines; e. Virginia to Florida, west to e. Texas, and north in Mississippi Valley to Arkansas.

↟ ASHLEAF MAPLE (BOX ELDER), *Acer negundo* p. 52
Riverbanks, floodplains, and fertile uplands; Nova Scotia, centr. Manitoba, and s. Alberta to Florida, Texas, and California.
↟ JAPANESE CORKTREE p. 52
Phellodendron japonicum (not illus.)
Oriental; occasionally escapes to the wild.



RED (Fruits with tapering seeds)

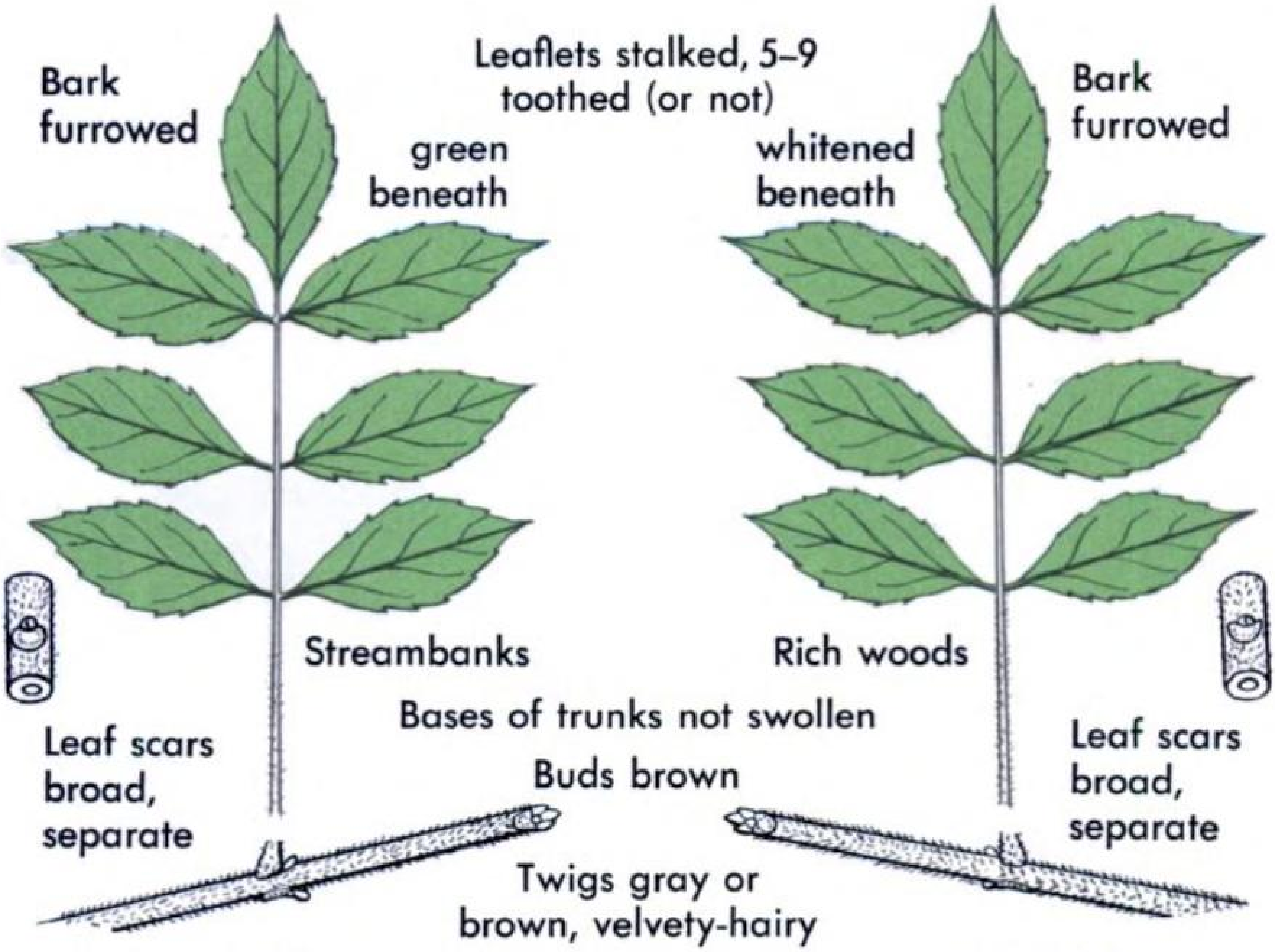
BILTMORE (Fruits with blunt seeds)

PUMPKIN (Fruits large, to 3")

WATER (Rather diamond-shaped)

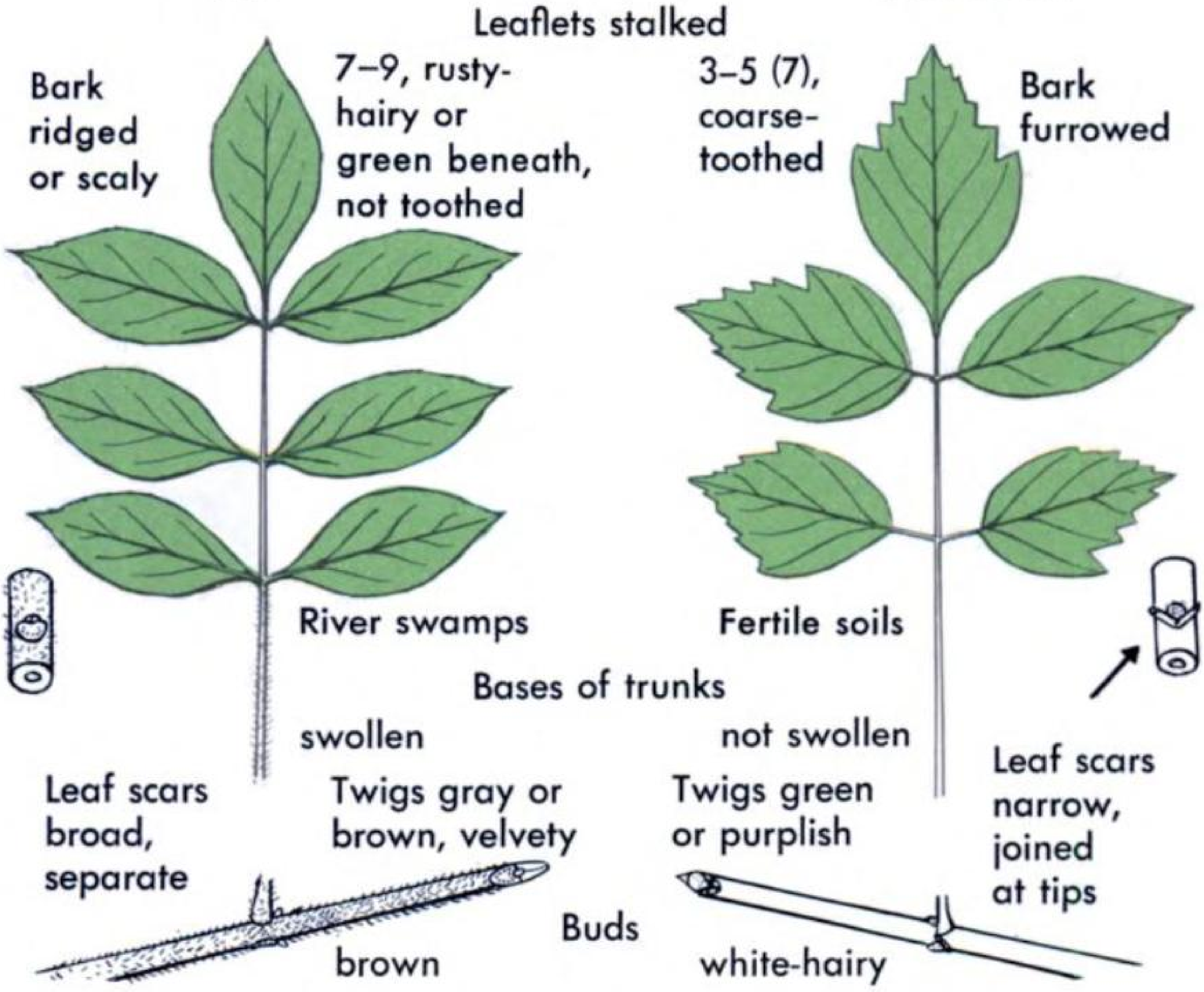
ASHLEAF MAPLE (Fruits paired)

FRUITS


Bark furrowed
Leaflets stalked, 5–9 toothed (or not)
green beneath
whitened beneath
Bark furrowed
Streambanks
Rich woods
Bases of trunks not swollen
Leaf scars broad, separate
Buds brown
Leaf scars broad, separate
Twigs gray or brown, velvety-hairy

RED

BILTMORE


Leaflets stalked
Bark ridged or scaly
7–9, rusty-hairy or green beneath, not toothed
3–5 (7), coarse-toothed
Bark furrowed
River swamps
Fertile soils
Bases of trunks
swollen
not swollen
Leaf scars broad, separate
Twigs gray or brown, velvety
Twigs green or purplish
Leaf scars narrow, joined at tips
Buds
brown
white-hairy

PUMPKIN

ASHLEAF MAPLE

BUCKEYES

The only trees or shrubs with opposite compound leaves whose leaflets are arranged like the spokes of a wheel.

♠ HORSECHESTNUT, *Aesculus hippocastanum* p. 53
Planted in towns; an occasional escape from cultivation.

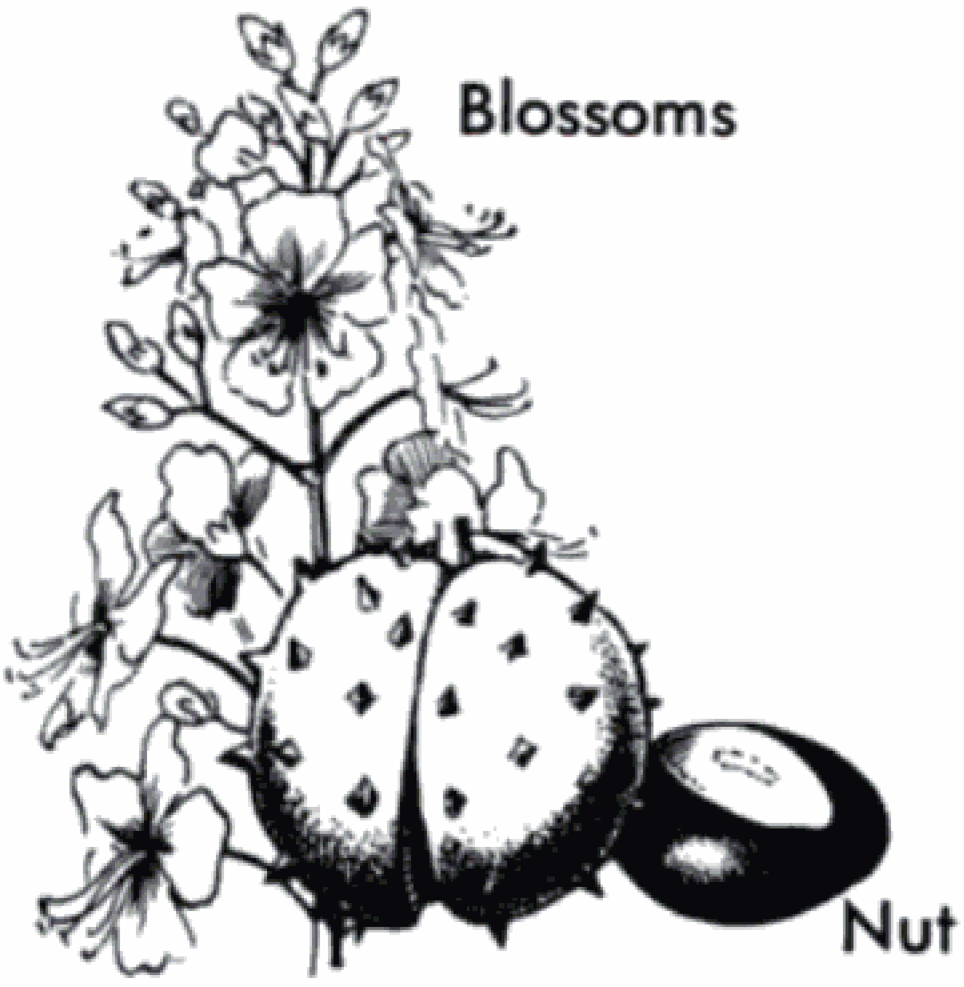
♠ SWEET BUCKEYE, *Aesculus octandra* p. 53
Woods; W. Virginia, sw. Pennsylvania, and s. Illinois to w. N. Carolina and n. Georgia.

♠ OHIO BUCKEYE, *Aesculus glabra* p. 53
Moist woods; W. Virginia, w. Pennsylvania, Iowa, and se. Nebraska to e. Tennessee, centr. Alabama, and centr. Oklahoma.

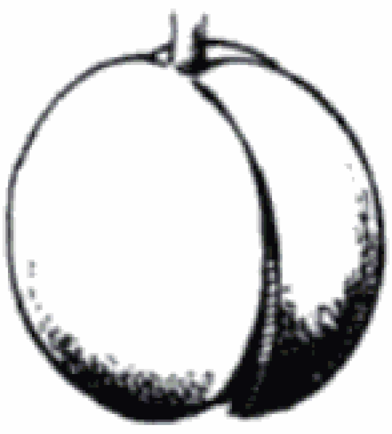
ψ DWARF BUCKEYE, *A. sylvatica* (not illus.) p. 54
Coastal Plain and Piedmont Plateau bottomlands; se. Virginia to Florida and Alabama.

♠ψ RED BUCKEYE, *A. pavia* (not illus.) p. 54
Coastal Plain woods; se. Virginia to Florida, west to centr. Texas, and north in Mississippi Valley to s. Illinois, se. Missouri, and se. Oklahoma.

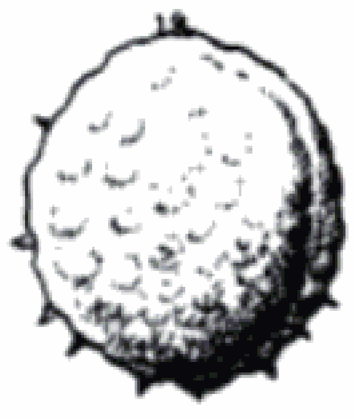
♠ψ PARTICOLORED BUCKEYE p. 54
A. discolor. (not illus.)
Woods; N. Carolina, Kentucky, and Missouri to Georgia and Texas.



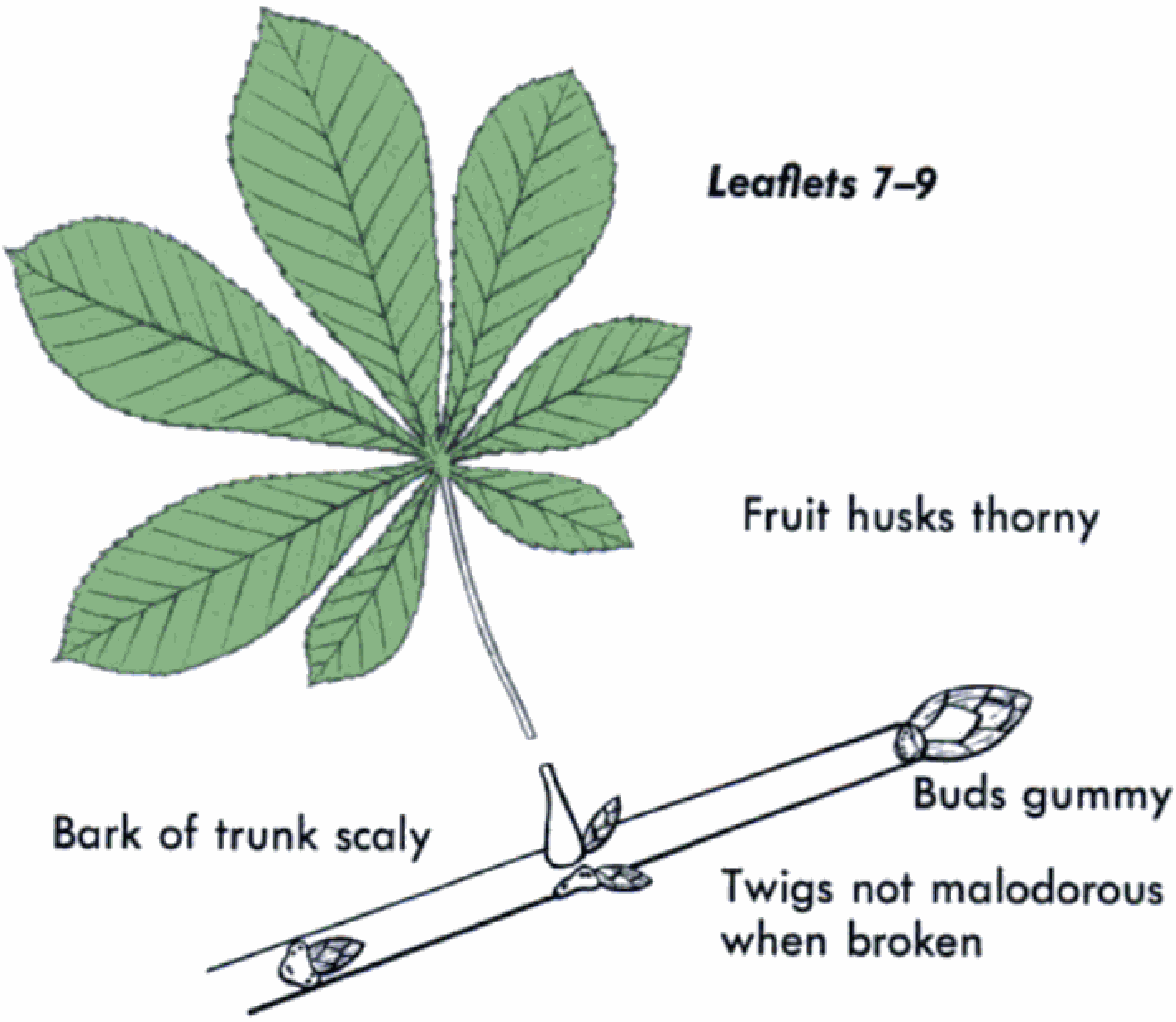
HORSECHESTNUT
(Fruit husk thorny)



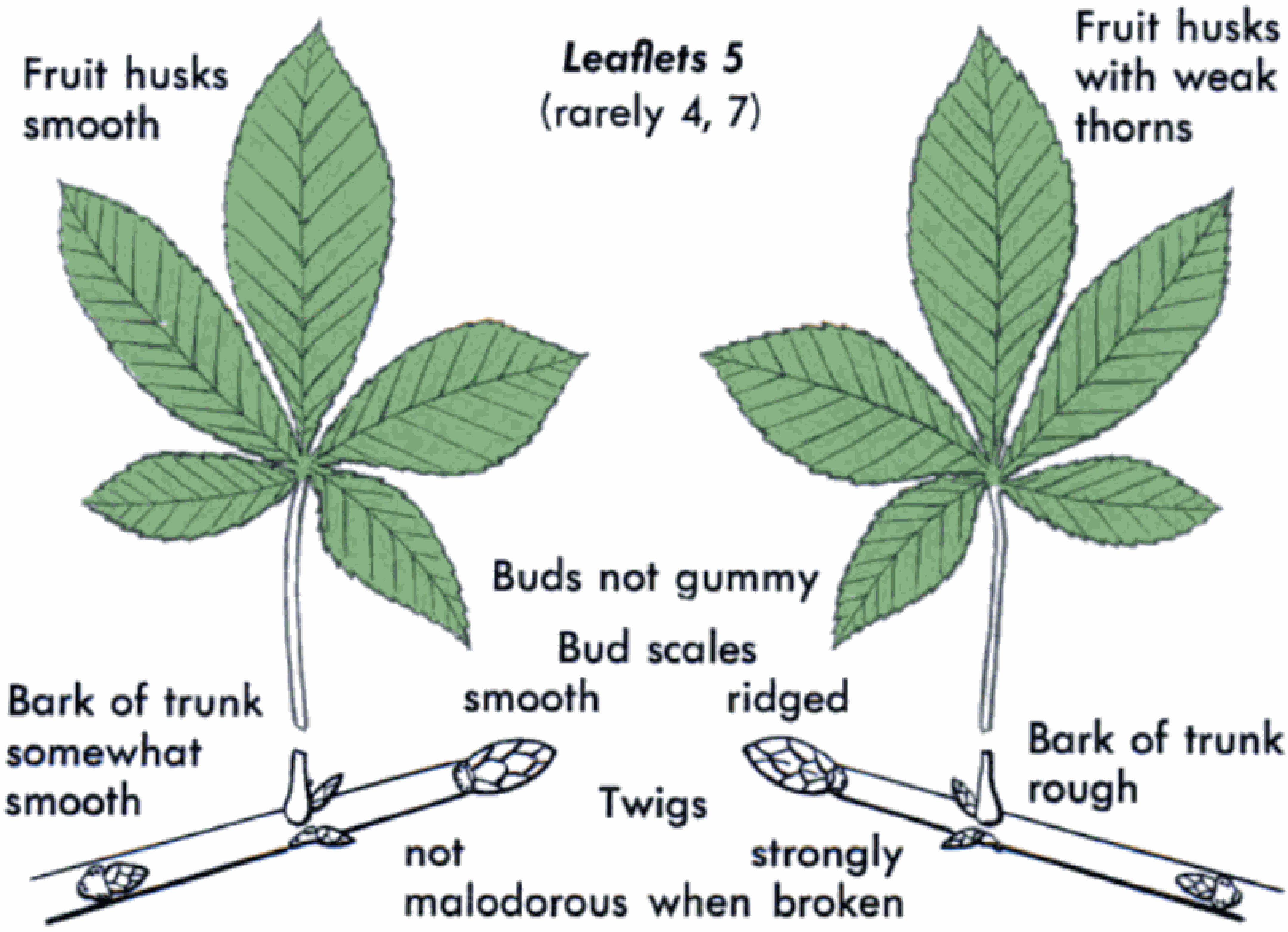
SWEET BUCKEYE
(Fruit husk smooth)



OHIO BUCKEYE
(Fruit husk weakly thorny when young or warty when old)


Leaflets 7–9
Fruit husks thorny
Buds gummy
Bark of trunk scaly
Twigs not malodorous when broken

HORSECHESTNUT


Fruit husks smooth
Leaflets 5 (rarely 4, 7)
Fruit husks with weak thorns
Buds not gummy
Bud scales
smooth
ridged
Bark of trunk somewhat smooth
Twigs
Bark of trunk rough
not
strongly
malodorous when broken

SWEET BUCKEYE **OHIO BUCKEYE**

SECTION III

Broad-leaved Plants with Opposite Simple Leaves

Though more numerous than those of Section II, the plants with opposite simple leaves are still so few as to be rather easily identified. In winter, of course, plants with opposite leaf scars may be members of either Section II or III and the drawings in both Sections must be reviewed. Care should be taken that the leaves or leaf scars on the stubby, scar-crowded spur branches of some alternate-leaved plants are not thought to be opposite or whorled. No opposite-leaved plants have spur branches (see p. 310).

When opposite simple leaves are present, the plants bearing them may be identified as follows:

	Name	*Plate*
1. Low creeping or trailing shrubs (plus the parasitic Mistletoe)	**CREEPING SHRUBS**	**12**
1. Climbing vines	**HONEYSUCKLES (1)**	**13**
1. Erect trees and shrubs:		
2. Leaves not toothed, although sometimes wavy-edged:		
3. Leaves not heart-shaped:		
4. Several papery scales present at twig bases (see Plate 14):		
5. Bundle scars 3	**HONEYSUCKLES (2)**	**14**
5. Bundle scars 1	**CORALBERRY, etc.**	**17**
4. Papery scales not present at twig bases:		
6. Leaves with veins that strongly tend to follow the leaf edges (see Plate 15):		
7. Bundle scars 3; uplands, or if bottomlands then only seasonally wet:		
8. Bud scales caplike, single	**BASKET WILLOW**	**56**
8. Bud scales 2	**DOGWOODS**	**15**
7. Bundle scars 1; plants always in or beside water	**BUTTONBUSH**	**16**
6. Leaves with veins only slightly, if at all, following the leaf edges:		
9. Buds long, slender, with 2 scales; bundle scars 3; plants not evergreen	**VIBURNUMS (1)**	**20**

	Name	*Plate*
9. Buds otherwise; bundle scars 1–3; evergreen or not	**MISCELLANEOUS**	**16, 17**
3. Leaves more or less heart-shaped, especially at the base	**LILAC, etc.**	**18**
2. Leaves definitely toothed:		
10. Toothed leaves not lobed:		
11. Leaves fine-toothed:		
12. Fruits various	**MISCELLANEOUS**	**19**
12. Fruits fleshy with single flat seeds	**VIBURNUMS (1)**	**20**
11. Leaves coarse-toothed:		
13. Bark thin and papery; flat-topped clusters of small dry fruits often present	**WILD HYDRANGEA**	**19**
13. Bark thicker; fruits fleshy	**VIBURNUMS (2)**	**21**
10. Toothed leaves lobed:		
14. Twigs very red-hairy; leaves oaklike	**OAKLEAF HYDRANGEA**	**19**
14. Twigs not red-hairy; leaves not oaklike	**VIBURNUMS (2); MAPLES**	**21, 22**

Low Creeping and Trailing Shrubs (and American Mistletoe)

(*Plate 12, p. 100*)

These are opposite-leaved sprawling shrubs or running vines, none of which climb or stand erect. (As a matter of convenience, a parasitic shrub of deciduous tree branches, American Mistletoe, is added here.) The group is readily recognizable by growth habits, both in summer and winter. The nonevergreen plants have single bundle scars.

The only other opposite-leaved plants of this type are one form of Red-osier Dogwood (Plate 15), which has toothless leaves whose veins strongly tend to follow the leaf edges, and Sandmyrtle (Plate 17), which is low but usually upright with shreddy bark. Pipsissewa leaves may be whorled, see page 179.

ST. ANDREW'S CROSS *Ascyrum hypericoides* L. **p. 100**

Recognition: A small, barely woody shrub whose leaves have numerous tiny *transparent dots* visible when held up to light (use lens). Leaves *narrowed at base,* not clasping, not toothed. Leafy appendages may occur in leaf angles. Foliage often remains on plant all winter. Twigs slender, round, *ridged;* larger branches *shreddy.* Buds small; 2 scales. Leaves ¼″–1″.

Height to 24″. Flowers with 4 petals and 4 sepals, yellow, July–Sept. Fruits small 2- or 4-parted capsules, Sept.–Oct.
Similar species: St. Johnsworts (Plate 17) are more upright and have 5-parted flowers. St. Peterswort has wider-based clasping leaves.

ST. PETERSWORT *Ascyrum stans* Michx. **p. 100**
Recognition: Similar to preceding species but with leaves longer and *upper leaves heart-shaped.* Twigs more stout. Leaves 1¼″–1½″.

AMERICAN STRAWBERRY-BUSH **p. 100**
Euonymus americanus L.
Recognition: A semi-upright or sprawling shrub with distinctive *green, squarish,* 4-lined twigs. Leaves narrow, fine-toothed, short-stalked, somewhat long-pointed and thin or only slightly thickened; they drop in winter. Leaves 2″–4″. Height 2′–7′. Flowers not obvious, greenish purple, May–June. Fruits *orange-red and warty,* beneath attractive *5-parted pinkish "husks,"* Sept.–Oct.
Similar species: (1) Burningbush (Plate 19) is more upright, with longer leafstalks, 4-lined but not squared twigs, smooth fruits and fewer-scaled buds. (2) Running Strawberry-bush is less upright, with wider leaves. The bittersweets (Plate 37) have similar fruits but they are more orange and leaves and buds are alternate.

RUNNING STRAWBERRY-BUSH **p. 100**
Euonymus obovatus Nutt.
Recognition: Similar to American Strawberry-bush but *trailing* over ground; branches occasionally taking root. Leaves *wider,* somewhat egg-shaped. Height to 1′.
Similar species: Japanese Honeysuckle (Plate 13) has nontoothed hairy leaves and brownish twigs.

PARTRIDGEBERRY *Mitchella repens* L. **p. 100**
Recognition: A delicate barely woody *trailing* plant. Leaves small egg- to heart-shaped, *evergreen, not toothed.* Leaves ¼″–1″. Flowers small, paired, tubular, white, fragrant, June–July. Fruits bright red, rarely white, edible, July–winter.
Similar species: Twinflower is more northern and has toothed leaves.
Remarks: A good indicator of acid soils. Fruits eaten by ruffed, spruce, and sharptail grouse, prairie chicken, bobwhite, raccoon, and red fox.

TWINFLOWER **p. 100**
Linnaea borealis var. *americana* (Forbes) Rehd.
Recognition: A slender barely woody *trailing* plant with small

broad *evergreen* leaves and *hairy* stems. Leaves rounded and most *few-toothed* near tips. Leaves ¼″–¾″. Flowers in pairs, small, drooping, white with purplish stripes, fragrant, June–Aug. Fruits small dry capsules.
Similar species: Partridgeberry leaves are not toothed.

ALPINE-AZALEA *Loiseleuria procumbens* (L.) Desv. **p. 100**
Recognition: A *northern*, low, gnarled *mat-forming* shrub. Leaves *evergreen*, small, leathery, *without teeth* and mostly elliptic, with edges much curled. Twigs smooth. Leaves ⅛″–⅜″. Height to 1′. Flowers small, white or pink, several per cluster, June–July. Fruits 2- or 3-valved, dry capsules.
Similar species: (1) Pachistima only other matlike evergreen with opposite leaves, and its leaves are fine-toothed. (2) Sandmyrtle (Plate 17) is taller.

PACHISTIMA *Pachistima canbyi* Gray **p. 100**
Recognition: An Appalachian *mat-forming* shrub with small, leathery, *fine-toothed*, narrow to wedge-shaped *evergreen* leaves. Twigs indistinctly 4-sided, often ringed with numerous stipule scars. Leaves ½″–1″. Height to 8″. Flowers small, brown or green, in angles of leaves, April–May. Fruits small capsules, Aug.–Sept.
Similar species: (1) Alpine-azalea has leaves without teeth. (2) Sandmyrtle (Plate 17) is taller, with shreddy older bark.

AMERICAN MISTLETOE **Not illus.**
Phoradendron flavescens (Pursh) Nutt.
Recognition: The only shrub *parasitic on* the *branches* of broad-leaved trees. The thick green leathery leaves are evergreen and wedge- to egg-shaped. Stems jointed. Leaves 1″–2″. Flowers small, Oct., Nov. Fruits, whitish, pulpy, globular, Nov. There is nothing else like it. Dwarf Mistletoe (p. 30) is very small; it has tiny needlelike leaves and occurs only on conifers. American Mistletoe grows on branches of deciduous trees; New Jersey, e. Pennsylvania, W. Virginia, s. Ohio, s. Illinois, and se. Kansas to Florida and e. Texas.
Remarks: Fruits eaten by many birds and mammals; apparently the plant is spread principally by birds.

Vines with Opposite Simple Leaves

(*including HONEYSUCKLES 1, Plate 13, p. 102*)

In addition to the climbing honeysuckles, 2 European and 2 native vines have opposite simple leaves. Two are escapes from cultivation; the others barely enter southeastern Virginia.

CLIMBING EUONYMUS **Not illus.**
Euonymus fortunei (Turcz.) Hand.-Maz.

Recognition: This and the next are the only vines of this group which climb by means of *aerial rootlets* like the Trumpet Creeper (Plate 7). Leaves elliptic, thick, *evergreen* and toothed. Twigs *green* and squarish. Leaves 1″–3″. Fruits reddish, beneath woody bracts. Sometimes spreads from plantings.

DECUMARIA *Decumaria barbara* L. **Not illus.**

Recognition: Like Climbing Euonymus and Trumpet Creeper (Plate 7), this native vine climbs by aerial rootlets. Leaves thin, *not evergreen,* egg-shaped, toothed or not. Twigs brown. Buds *red-hairy,* unlike those of Trumpet Creeper (p. 47), which are greenish, smooth, and scaly. Leaves 1½″–7″. Flowers white, clustered, fragrant, May–June. Fruits many-seeded capsules, July–Aug. Damp woods; se. Virginia and Tennessee to Florida and Louisiana.

FALSE JESSAMINE **Not illus.**
Gelsemium sempervirens (L.) Ait. f.

Recognition: A twining vine with narrow to egg-shaped evergreen, somewhat leathery leaves that are not toothed. Unlike honeysuckles, *no persistent scales* remain at twig bases. Twigs hairless, with *solid pith* (all vine honeysuckles have hollow pith). Leaves sharp-tipped and *separate* (see honeysuckles). Leaves 1″–2½″. Flowers yellow, bell-shaped, clustered, very fragrant, March–May. Fruits capsules. Woods; se. Virginia and Arkansas to Florida and Texas.

SILKVINE *Periploca graeca* L. **Not illus.**

Recognition: Twining vine with *hollow pith, milky sap,* and small buds *nearly hidden* by much raised leaf scars. Flowers dark, June–Sept. Fruits milkweedlike pods. European escape, New England and Kansas to Florida and Oklahoma. See following.

Honeysuckles (1): Climbing Vines

(*Plate 13, p. 102*)

These 8 forms are the only climbing vines with opposite leaves which ascend by twining stems, without benefit of tendrils, aerial rootlets, clasping leafstalks, or other secondary aids (except see False Jessamine and Silkvine, above). The pith of all vine honeysuckles is hollow (lacking). The twig bases are marked by persistent scales where they join the older branchlets. The opposing leaf scars are connected by lines and the bark is papery. The tubular flowers of all species except the Trumpet Honeysuckle have a single lower and 4 upper lobes at the mouth of the tube

(Type A). Those of that species have starlike regularly distributed lobes at the tube mouth (Type B).

Unfortunately, the members of this group with few exceptions are inconsistent in hairiness and in leaf and bud characteristics. The leaves are *never toothed* but their shapes vary considerably. The upper 1 to 4 pairs of leaves may be fused. Winter characteristics are not well known.

JAPANESE HONEYSUCKLE **p. 102**
Lonicera japonica Thunb.

Recognition: An aggressive imported vine forming *dense tangles* climbing over underbrush or sprawling over open ground. Twigs and leaves *densely hairy,* green on both sides, or purplish beneath. Upper leaves *not united;* lower leaves often lobed in the White Oak manner. Foliage often *evergreen,* or nearly so. Leaves 1½″–3½″. Flowers ½″–1″, mostly single, white or yellowish, sometimes tinged with red or purple, hairy inside, April–July. Fruits *black* berries, Sept.–Nov.

Similar species: Only vine honeysuckle with berries not red. Among climbing honeysuckles, only this and (1) Woodbine Honeysuckle have end leaves not united. (2) Running Strawberry-bush (Plate 12) has green 4-lined stems.

Remarks: Fruits eaten by many birds and mammals and the dense cover is much used, but generally speaking it is a weed.

WOODBINE HONEYSUCKLE **Not illus.**
Lonicera periclymenum L.

Recognition: Similar to Japanese Honeysuckle but less hairy, with *red berries* and flowers ⅞″–1⅛″ long, in dense circular clusters. Of European origin. Thickets; Newfoundland to Nova Scotia.

HAIRY HONEYSUCKLE *Lonicera hirsuta* Eat. **p. 102**

Recognition: Somewhat like Japanese Honeysuckle but more *high-climbing* and with *united upper leaves.* Foliage *not evergreen.* Flowers orange-yellow and sticky-hairy. Fruits *red.*

MOUNTAIN HONEYSUCKLE *Lonicera dioica* L. **p. 102**

Recognition: A low-climbing vine whose leaves are green above and *whitened beneath.* Upper *united* leaves usually are *pointed.* Leaves typically hairless but var. *glaucescens* (Rydb.) Butters is white-hairy beneath. Lower leaves *narrow.* Twigs *hairless.* Leaves 1½″–3½″. Flowers ½″–1″, in crowded whorls, greenish yellow to red or purple, hairy inside, base obviously swollen on one side, May–July. Fruits red, July–Sept.

Similar species: (1) Trumpet Honeysuckle also has leaves distinctly whitened beneath, but narrower. (2–4) The next 3 species have flower-tube base not much swollen.

ROCK HONEYSUCKLE **p. 102**
Lonicera prolifera (Kirchn.) Rehd.

Recognition: Somewhat similar to Mountain Honeysuckle but more coarse, with top *united leaves circular,* or nearly so, and *much whitened above* as well as below. Lower leaves too are mostly *rounded.* Sometimes foliage is slightly hairy beneath. Flowers pale yellow, not much swollen at base, May–June. Fruits July–Oct.

Similar species: Only one of this group with the leaves distinctly and obviously whitened above.

YELLOW HONEYSUCKLE *Lonicera flava* Sims **p. 102**

Recognition: *Southern,* and unlike preceding 2 species the leaves are *merely grayish* beneath. Leaves just below united leaves have no stalks. Leaves 1½″–3½″. Flowers about 1³⁄₁₆″ long, *orange-yellow,* tubes hairless or slightly hairy *within,* April–May. Fruits red, Aug.–Sept.

Similar species: See Pale Honeysuckle.

PALE HONEYSUCKLE **Not illus.**
Lonicera flavida Cockerell

Recognition: Like Yellow Honeysuckle but leaves just below the united leaves have *short stalks.* Flowers ¾″–1″, pale yellow, *very hairy within tube.* Limestone areas; w. S. Carolina and Kentucky to Tennessee and Missouri.

TRUMPET HONEYSUCKLE *Lonicera sempervirens* L. **p. 102**

Recognition: A climbing vine with long *slender blossoms* unlike other climbing honeysuckles. Leaves *whitened beneath* and those not united often are slender but may be elliptic. More or less evergreen. Leaves 1½″–3½″. Flowers long, *reddish, vaselike,* with lobes at mouth evenly spaced, April–Sept. Fruits red, Aug.–Oct.

Similar species: Mountain Honeysuckle is only other of this group with leaves green above and much whitened beneath.

Honeysuckles (2): Erect Shrubs

(*Plate 14, p. 104*)

Honeysuckles are among the few shrubs having scales that remain at the bases of the twigs, marking the boundaries between the twigs of the present season and the branchlets of the previous year (see Plate 14). Other woody plants with this characteristic are the hydrangeas and Bush-honeysuckle (Plate 19), which have leaves that are more heart-shaped and toothed, and the

Coralberry and Snowberry (Plate 17), which have only 1, rather than 3, bundle scars per leaf scar. In winter, hydrangeas usually bear umbrellalike clusters of dried fruit capsules in contrast to the berries of honeysuckles; their twigs too are usually more shiny and stout. The ridged twigs of the Bush-honeysuckle are distinctive. The prominent fruits of the Coralberry and Snowberry frequently are present in winter. Occasionally honeysuckles bear several buds, one above the other, where 1 normally grows. When present, this definitely separates them from the other plants mentioned. Honeysuckle leaves are not toothed, and the bark of twigs and branchlets, at least, is papery. Opposing leaf scars are connected by lines. The bundle scars are 3. In contrast to the climbing honeysuckles, these bushy plants, which rarely exceed 10 feet, may be identified by both leaf and twig characteristics. When present, the white, pink, or yellowish flowers are aids. The blossoms mostly are of 2 types, as diagrammed. One group of species has the petal lobes arranged unevenly in 2 sections (Type A), while the other has rather regularly spaced petal lobes at the mouth of the tube (Type C). The Northern Honeysuckle has short petal lobes but generally resembles the Type C pattern.

The erect honeysuckles do not have united upper leaves as in some vine species. The upright honeysuckles that have hollow pith (pith lacking) are of Eurasian origin. Those with solid pith are native species. (One Asiatic importation with solid pith has very limited American range as an escape.)

TARTARIAN HONEYSUCKLE *Lonicera tatarica* L. **p. 104**

Recognition: A shrubby honeysuckle with *hollow branchlets.* Leaves elliptic to heart-shaped and nearly hairless. Buds *short and blunt.* Leaves 1½″–2½″. Height to 10′. Flowers Type C, pink, rarely white, ⅝″–⅞″, stalks longer than flowers, May–June. Fruits red, rarely yellow, berries, June–Aug.

Similar species: Four shrub honeysuckles, one a hybrid, have hollow piths: (1) European and (2) Morrow Honeysuckles are hairy; (3) hybrid Bella Honeysuckle is similar but flower stalks are shorter than the flowers; (4) see also Snowberry (Plate 17).

EUROPEAN HONEYSUCKLE *Lonicera xylosteum* L. **p. 104**

Recognition: Similar to Tartarian Honeysuckle but twigs and leaf undersides, at least, usually *gray-hairy.* Buds *long and sharp.* Flowers Type A, pink, yellowish, or white, about ⅜″ long, stalks of variable length. Fruits red.

MORROW HONEYSUCKLE **Not illus.**

Lonicera morrowi Gray

Recognition: Similar to European Honeysuckle, but has narrow or oblong leaves that are gray-hairy beneath. Buds short and conical. Flowers about ⅞″ long, white to yellow. Fruits red or yellow. Leaves 1″–2″. Eurasian; escaped to thickets; Maine and Michigan to New Jersey and Pennsylvania.

BELLA HONEYSUCKLE **Not illus.**
Lonicera morrowi Gray × *L. bella* Zabel

Recognition: An Asiatic hybrid having characteristics appearing as intermediate between Tartarian and Morrow Honeysuckles. Leaves elliptic or egg-shaped. Twigs and foliage hairless or nearly so. Flower stalks shorter than the pink to yellow Type C flowers. Escape; Maine and New York to New Jersey and Pennsylvania.

FOUR-LINED HONEYSUCKLE **p. 104**
Lonicera involucrata (Richards.) Banks

Recognition: An upright shrub with solid white pith and *4-lined* and squarish twigs. Twigs and foliage *hairless* or nearly so and leaves elliptic or somewhat oblong. Lower bud scales as long as buds; more than 2 evident. Leaves 2″–5″. Height to 10′. Flowers yellowish, unlike others of this group in that they are *cylindrical for most of their ⅜″–⅝″ length,* with quite short petal lobes and located above 4 conspicuous green to purplish leaflike bracts (the involucre), June–July. Fruits black, July–Aug.
Similar species: Only honeysuckle with 4-lined twigs. Also has unique flowers and black berries.

SWAMP HONEYSUCKLE **p. 104**
Lonicera oblongifolia (Goldie) Hook.

Recognition: A more or less *hairless* honeysuckle with solid pith. Twigs and leaf undersides finely hairy to hairless. Leaves somewhat oblong to egg-shaped. Bud scales several, lower ones as long as bud. Leaves 1″–3½″. Height to 5′. Flowers Type A, yellowish, rarely white, ⅜″–⅝″, stalks longer than blossoms, May–June. Fruits *orange to red,* July–Aug.
Similar species: (1) Northern Honeysuckle is hairy, has 2-scaled buds, blue fruits. (2) Canada Honeysuckle has shorter outer bud scales. Both have more rounded leaves, Type C flowers. (3) Standish Honeysuckle has very long-pointed leaves.

NORTHERN HONEYSUCKLE **p. 104**
Lonicera villosa (Michx.) R. & S.

Recognition: A small *hairy* honeysuckle with solid pith and 2 bud scales that cover buds like a pea pod. Twigs and both leaf surfaces *densely hairy,* but some varieties hairless or nearly so. Leaf edges typically *fringed* with fine hairs. Leaves 1″–2½″. Height to 3½′. Flowers Type C, yellowish, about ⅝″, stalks much shorter than flowers, April–July. Fruits *blue,* May–Aug.
Similar species: Bud type and fruit color are distinctive, whether plant is hairy or not.

CANADA HONEYSUCKLE *Lonicera canadensis* Bartr. **p. 104**
Recognition: A mostly *hairless* honeysuckle with solid pith and lower bud scales shorter than buds. Twigs generally *hairless* as are egg- to heart-shaped leaves, except that leaf edges are *fringed* with fine hairs. Leaves 1″–3″. Height to 6′. Flowers Type C, yellowish or yellowish green, about ¾″, stalks longer than blossoms, April–July. Fruits *red*, June–Aug.
Similar species: See Swamp Honeysuckle.

STANDISH HONEYSUCKLE **Not illus.**
Lonicera standishii Jacq.
Recognition: Escaped from gardens on Long Island, New York, this Asiatic resembles the last in having solid pith, fringed leaves, red berries. It is nearly evergreen, however, and the leaves are much *long-pointed.* Twigs somewhat bristly-hairy. See Swamp Honeysuckle. Height to 8′. Flowers Type A, white, short-stalked, April.

Dogwoods

(*Plate 15, p. 106*)

In addition to the Flowering Dogwood, which grows to tree size, there are 9 species that have less conspicuous blossoms. These usually are shrubs but some rarely grow to small tree size. One of these shrubs has alternate leaves (see Plate 59). All species have leaf veins that strongly tend to follow the leaf edges toward the leaf tips. The buds have 1 pair of scales and the bundle scars are 3. Twigs, branchlets, and pith often are distinctively colored. Flowers and fruits of the shrubby species are in umbrella-shaped clusters. The fleshy fruits (drupes) have a single stony seed.

In winter the dogwoods may resemble some viburnums (Plates 20 and 21) or maples (Plate 22), but the leaf scars on the new twigs are raised in the dogwoods. See also Plate 59.

ROUNDLEAF DOGWOOD *Cornus rugosa* Lam. **p. 106**
Recognition: A medium-sized shrub usually with broadly egg-shaped to *nearly round* leaves. Some plants may have narrower leaves. Twigs *greenish* or red-brown, marked with *purplish blotches.* Leaves have *5–9 pairs of veins* and are woolly to hairless beneath. Leaves 2″–5″. Height to 10′. Flowers in flat-topped clusters, May–July. Fruits *light blue*, rarely white, Aug.–Oct.
Similar species: No other dogwood has purple-blotched greenish twigs.
Remarks: Fruits eaten by ruffed and sharptail grouse. Twigs are consumed by cottontail, moose, and are a favorite of white-tail deer.

FLOWERING DOGWOOD *Cornus florida* L. **pp.** *11,* **106**

Recognition: A small to medium-sized tree with hidden side buds and *stalked* flower buds. Leaves hairless or nearly so, elliptic to egg- or wedge-shaped, *5–6 pairs* of veins. Twigs and branchlets sometimes green, *mostly dark purple,* often swollen from insect attacks. Pith white. Trunk bark dark, *deeply checkered* in an alligator-hide-like pattern. Leaves 2″–5″. Height 10′–40′; diameter 12″–18″. Flowers small, clustered, each cluster with 4 (rarely 6–8) *large white or seldomly pink bracts* (not true petals), March–June. Fruits *red* or rarely yellow, Aug.–Nov. **Similar species:** Only dogwood with showy white bracts, hidden side buds, and stalked flower buds. Checkered bark less corky than similar barks of blackhaw viburnums (Plate 20) or (1) Persimmon (Plate 68). (2) Common Mock-orange (Plate 19) has leaf scars not raised and bark of branchlets thin and papery. **Remarks:** Powdered bark is reported to have been made into a toothpaste, a black ink (when mixed with iron sulphate), and a quinine substitute. Bark of the roots yields a scarlet dye. Shuttles, bobbins, tool handles, mallets, and golf club heads are manufactured from the hard close-grained wood. Humans find the bitter red fruits inedible, but with twigs they are important foods of numerous song and game birds, skunks, deer, rabbits, and squirrels.

RED-PANICLE DOGWOOD *Cornus racemosa* Lam. **p. 106**

Recognition: A small or medium-sized shrub with light gray branchlets and *clusters (panicles) of white fruits supported by red stems.* Leaves elliptic to egg-shaped, usually with 3–5 pairs of veins, somewhat whitened, hairless or slightly hairy beneath. Twigs brownish; pith light brown. Leaves 1″–5″. Height to 10′. Flowers small, whitish, in long *cone-shaped clusters,* June–July. Fruits white, red-stemmed, July–Oct.

Similar species: (1) Roughleaf and (2) Price Dogwoods have sandpapery, woolly foliage and twigs, round-topped fruit clusters. (3) Stiff Dogwood has reddish twigs, white pith, and bluish fruits.

Remarks: Fruits eaten by pheasant and ruffed and sharptail grouse.

RED-OSIER DOGWOOD *Cornus stolonifera* Michx. **p. 106**

Recognition: A small to medium-sized shrub with *bright red* or, less commonly, green twigs and branchlets and *white pith.* A rare form (*repens* Vict.) is creeping and carpet-forming, with small leaves. Leaves elliptic with 3–5 (less commonly 6–7) pairs of veins, *whitened,* hairless or somewhat silky beneath. Var. *baileyi* (Coult. and Evans) Drescher has brownish-red hairy twigs and leaves densely woolly beneath. Leaves 2″–5″.

Height to 10′. Flowers small, whitish, *in flat-topped clusters,* May–Aug. Fruits *white,* July–Oct.
Similar species: Only Stiff Dogwood also may have red twigs and white pith, but leaves not whitened beneath and fruits are blue and in round-topped clusters.
Remarks: Fruits much sought after by songbirds, ruffed and sharptail grouse, bobwhite, and European partridge. Twigs eaten by deer, elk, moose, cottontail, and snowshoe hare.

STIFF DOGWOOD *Cornus foemina* Mill. **Not illus.**
Recognition: Similar to Red-osier Dogwood and, like it, with white pith. Stiff Dogwood more *southern;* twigs and branchlets may be reddish or *brownish.* Leaves green on both sides, slightly paler but *not whitened* beneath, somewhat long-tipped, 4–5 pairs of veins. Leaves 2″–5″. Height to 15′. Flowers small, whitish, in somewhat *round-topped clusters,* May–June. Fruits *blue,* Aug.–Oct. See Red-osier Dogwood and Red-panicle Dogwood. Wet places; e. Virginia, s. Indiana, se. Missouri to Florida and Texas.

SILKY DOGWOOD *Cornus amomum* Mill. **p. 106**
Recognition: A small to medium-sized shrub with dull-*purple silky-hairy twigs and brown pith.* Leaves broadly egg-shaped, less than twice as long as broad, with wide *rounded bases* and 3–5 pairs of veins, smooth above and hairless or somewhat brown- or gray-hairy beneath. Branchlets as well as twigs dull purple. Leaves 2″–4″. Height to 10′. Flowers small, whitish, in flat-topped clusters, June–July. Fruits *bluish,* Aug.–Oct.
Similar species: (1) Narrowleaf Dogwood has narrower leaves, tapering leaf bases; probably these 2 cannot be separated in winter, unless dead leaves can be located. (2) Roughleaf and (3) Price Dogwoods have "sandpapery" upper leaf surfaces and rough-hairy twigs.

NARROWLEAF DOGWOOD *Cornus obliqua* Raf. **Not illus.**
Recognition: Like Silky Dogwood but leaves narrower, with *tapered bases,* whitened or white-hairy beneath. Leaves *twice as long as broad,* or longer. Wet places; New Brunswick and N. Dakota to New Jersey, W. Virginia, Kentucky, Oklahoma.

ROUGHLEAF DOGWOOD **p. 106**
Cornus drummondi Meyer
Recognition: A midwestern shrub or in South a medium-sized tree. Leaves *sandpapery above, woolly beneath,* egg-shaped or elliptic with 3–5 pairs of veins. Twigs *red-brown* or brownish; branchlets brown or gray. Pith *brown,* rarely white. Leaves 2″–5″. Height 4′–15′ (50′); diameter 2″–8″ (10″). Flowers small, whitish, in round-topped clusters, petals 3/16″–1/4″, May–June. Fruits white, 3/16″–1/4″, Aug.–Oct.

Similar species: (1) Price Dogwood the only other dogwood with rough leaves and rough-hairy twigs. (2) Red-panicle Dogwood has brownish twigs but they are not sandpapery as in this species.
Remarks: Fruits eaten by many songbirds and by prairie chicken, sharptail and ruffed grouse, bobwhite, wild turkey, pheasant.

PRICE DOGWOOD *Cornus priceae* Small **Not illus.**
Recognition: Nearly identical with Roughleaf Dogwood, sometimes considered same species. Leaves broader. Fruits *less than ³⁄₁₆" in diameter.* River bluffs; Kentucky and Tennessee.

Miscellaneous Plants with Opposite Leaves Not Toothed (1) and (2)

(*Plates 16 and 17, pp. 108, 110*)

Among the upright woody plants with opposite (or whorled) leaves that are not toothed are the honeysuckles and dogwoods, previously discussed. There are a number, however, of miscellaneous additional species. Those with heart-shaped leaves are given on Plate 18. Those miscellaneous species with leaves not heart-shaped are shown on Plates 16 and 17.

1. Plate 16

(*p. 108*)

Some of these plants may have leaves and leaf scars in whorls of 3. Only 1, the Fringe-tree, may grow to tree size.

SHEEP LAUREL *Kalmia angustifolia* L. **p. 108**
Recognition: A small shrub with *leathery, evergreen,* narrow to oblong leaves. Leaves *flat,* opposite or in whorls of 3. Mostly less than 2½" long; sometimes rust-colored beneath when young but *green or pale green* beneath when mature. A southern variety that occurs north to Virginia has leaves pale and fine-hairy beneath. Twigs round in cross section and hairless. Leaves 1½"–2". Height to 3'. Flowers cuplike, ⅜"–½" across, with pollen-bearing anthers of stamens tucked in pockets near the border and springing out suddenly when center of flower is probed; pink, red, or rarely white, in clusters *along sides* of twigs, May–Aug. Fruits 5-parted capsules; all winter.
Similar species: (1) Pale Laurel has whitened leaf undersides, rolled leaf edges, and 2-edged twigs. (2) Mountain Laurel (Plate 65) has larger, mostly alternate leaves. (3) Sandmyrtle (Plate 17) has smaller crowded leaves.

Remarks: Though normally shunned by livestock, foliage may be poisonous, hence such names as Sheepkill, Lambkill, Calfkill. Peculiar action of stamens forces nectar-seeking insects to carry pollen.

PALE LAUREL *Kalmia polifolia* Wang. **p. 108**

Recognition: Differs from Sheep Laurel in having leaves *strongly whitened beneath,* leaf edges *rolled,* leafstalks *lacking,* or nearly so, twigs 2-edged, and flower clusters at *twig tips.* Leaves seldom occur in 3's. Height to 2′. Flowers ½″–⅞″ across, May–July.

DEVILWOOD **Not illus.**
Osmanthus americanus (L.) Gray

Recognition: The only *tree* with *opposite* leathery leaves. Leaves evergreen, shiny, thick, narrow, and green or pale beneath. They somewhat resemble Mountain Laurel (Plate 65), whose leaves occasionally are opposite but more narrow (see also Southern Wild-raisin, Plate 20). Twigs hairless, stout, *whitish.* Leaves 2″–6″. Height to 50′. Flowers small, white, clustered on twigs, April–May. Fruits purplish, fleshy, 1-seeded, about ⅜″ long, June. Swamps; se. Virginia to Florida and se. Louisiana.

COMMON PRIVET *Ligustrum vulgare* L. **p. 108**

Recognition: A tall European shrub escaping from plantings. Leaves firm but not tough and leathery, not evergreen, slightly less than 2½″ long, never in 3's, not aromatic, elliptic, and hairless. Twigs slender (1/16″ or less thick), barely fine-hairy or hairless. Central end bud present; buds have 4 or more blunt scales; bundle scar single. Leaf scars much raised. Leaves 1″–2¼″. Height to 15′. Flowers small, white, in cone-shaped clusters at twig ends, June–July. Fruits small black berries, Sept.–Oct., or longer.

Similar species: (1–3) Next 3 privets are less common and have pointed bud scales or very hairy twigs. (4) In winter, Fringe-tree also has true end buds present, but twigs are stouter, over 1/16″ thick, and leaf scars not raised.

Remarks: Fruits eaten by some song and game birds.

CALIFORNIA PRIVET **Not illus.**
Ligustrum ovalifolium Hassk.

Recognition: Similar to Common Privet in having hairless twigs, but leaves are shiny, more leathery, and may be evergreen. Bud scales *long-pointed.* Occasionally escapes from cultivation, especially toward the South.

AMUR PRIVET *Ligustrum amurense* Carr. **Not illus.**

Recognition: Resembles Common Privet in general appearance but is like Regal Privet in having twigs *densely hairy* and bud *scales blunt.* Leaves hairy beneath, at least along midrib, and usually tips pointed. Escaped cultivation; se. Virginia southward.

REGAL PRIVET **Not illus.**
Ligustrum obtusifolium Sieb. & Zucc.

Recognition: Like Amur Privet but leaves mostly *blunt-tipped.* Escaped from cultivation; e. Pennsylvania southward.

BUCKLEYA *Buckleya distichophylla* Torr. **Not illus.**

Recognition: A shrub that grows as a *parasite* attached to *hemlock roots.* Leaves rounded at base but with long-pointed tips. Twigs slightly hairy; twigs and branchlets pale brown. Buds have 6–7 scales, pointed. Central end bud lacking; leaf scars with 1 bundle scar. Leaves 1″–2½″. Height to 12′. Flowers greenish, clustered, May. Fruits 1-seeded, somewhat elongate. Scarce; w. Virginia to w. N. Carolina and e. Tennessee.

NESTRONIA *Nestronia umbellula* Raf. **Not illus.**

Recognition: Somewhat like Buckleya but smaller, *parasitic on roots of broad-leaved trees.* Most leaves pointed at both ends; some may be blunt-tipped. Twigs hairless; branchlets dark gray. Buds small. Leaves 1″–2½″. Height to 3′. Flowers May–June. Fruits ball-shaped. Mountains; w. Virginia to Georgia and Alabama.

BUTTONBUSH *Cephalanthus occidentalis* L. **p. 108**

Recognition: An *aquatic* shrub with leaves over 2½″ long, often occurring in 3's and 4's, elliptic and short-pointed. Leafstalks often red. Side buds imbedded in bark; end buds false. Twigs round, with single bundle scar. Var. *pubescens* Raf. has velvety-hairy twigs and leaf undersides (typical plant is hairless). The rare forma *lanceolatus* Fern. has narrow leaves. Leaves 3″–6″. Height 3′–8′ (18′). Flowers small, white, tubular, densely clustered in *ball-like heads,* May–Aug. Fruits small, dry, Sept.–Dec., or later.

Similar species: Swamp Loosestrife has ridged twigs.

Remarks: Honey plant. Wilted leaves may poison stock.

SWAMP LOOSESTRIFE **Not illus.**
Decodon verticillatus (L.) Ell.

Recognition: A shrub that is woody principally at the stem base. Like Buttonbush, the leaves occur in pairs or in 3's and plant grows in or near ponds. Leaves narrow, short-stalked, and hairy or hairless beneath. Twigs *angular* with 4–6 prominent lengthwise ridges. Stems often spongy near base; twig tips usually bend downward and older bark light brown and flaky. Leaves 2″–5″. Height to 4′. Flowers showy, magenta. Pond edges and wet ground; centr. Maine, s. Ontario, s. Michigan, and Minnesota to Virginia and Tennessee.

SEA-OXEYE *Borrichia frutescens* (L.) DC. **Not illus.**
Recognition: Low finely gray-hairy shrub with *narrow leaf scar pairs encircling branchlets.* Leaves somewhat leathery, either without teeth or spiny-toothed. Twigs with fine lengthwise lines. Flowers yellow, sunflowerlike, July–Oct. Salt marshes, District of Columbia to Florida and Texas.

SMOOTH ALLSPICE *Calycanthus fertilis* Walt. **p. 108**
Recognition: A woodland shrub with leaves and twigs that are hairless and *spicy-scented* when crushed. Leaves thin, nonevergreen, over 2½″, somewhat rough above, generally egg-shaped, with blunt or sharp tips. Foliage sometimes whitened beneath. Twigs swollen at leaf scars and hairless or barely fine-hairy; buds hairy without evident scales, leaf scar U-shaped with 3 bundle scars. Central end bud is lacking. Leaves 2½″–7″. Height to 6′. Flowers brownish, without much odor, May–Aug. Fruits fleshy, Sept.–winter.
Similar species: Only the 2 allspices are opposite-leaved and aromatic.
Remarks: Seeds reported to be poisonous.

HAIRY ALLSPICE *Calycanthus floridus* L. **Not illus.**
Recognition: Similar to Smooth Allspice but more southern, with twigs and leaf undersides *soft-hairy.* Flowers very fragrant, giving off a strawberrylike odor. Flowers April–Aug. Woods; Virginia and s. W. Virginia to Florida and Mississippi.

FRINGE-TREE *Chionanthus virginicus* L. **p. 108**
Recognition: A shrub or small tree with leaves over 2½″ long and true end buds present. Leaves moderately large, nonevergreen, nonaromatic and hairless or nearly so, narrow egg-shaped to elliptic. Twigs moderately stout, over 1⁄16″ thick, slightly hairy or hairless. Buds scaly, bundle scar 1. Leaves 3″–8″. Height 8′–18′ (35′); diameter 1″–4″ (8″). Flowers white in drooping clusters, petals very slender, May–June. Fruits purple, ball-shaped, fleshy, Sept.–Oct.
Similar species: The privets have twigs under 1⁄16″ thick and raised leaf scars. In winter, lilac (Plate 18) buds are thick and fleshy rather than papery. Northern Wild-raisin (Plate 20) has only 2 bud scales. Ashes (Plates 9, 10) have more bundle scars.

Miscellaneous Plants with Opposite Leaves Not Toothed (2)

(2. *Plate 17, p. 110*)

All of these plants are shrubby. None have whorled leaves (but the St. Johnsworts may have leafy shoots clustered in the angles of the larger paired leaves). Bundle scars are single.

CORALBERRY *Symphoricarpos orbiculatus* Moench **p. 110**

Recognition: A shrub with scales present where twigs *meet the branchlets.* Leaves elliptic to nearly circular, sometimes wavy-edged, no transparent dots. Twigs and leaf undersides barely or quite hairy. Twigs and branchlets round, with *papery* bark. Pith solid, white. Leaves 1″–2″. Height to 6′. Flowers greenish to purple, *bell*-shaped, clustered, less than 3/16″, July–Aug. Fruits berrylike, *coral to purple,* less than 3/8″, Sept.–winter.

Similar species: Shrubby honeysuckles (Plate 14) and hydrangeas (Plate 19) have scales at twig bases but have 3 bundle scars. (1) Snowberry and (2) Wolfberry have hollow pith, white fruits.

Remarks: Numerous songbirds, bobwhite, ruffed grouse, prairie chicken, pheasant, "Hungarian" partridge, and wild turkey occasionally eat the fruits.

SNOWBERRY *Symphoricarpos albus* (L.) Blake **p. 110**

Recognition: Somewhat similar to Coralberry but pith *hollow.* Leaves and twigs hairless or barely hairy. Leaves 1″–2″. Height 1′–3′ (6′). Flowers pink, 1/4″–3/8″ long, short-stalked, May–July. Fruits *white,* 1/4″–5/8″, seeds 3/16″–1/4″, Aug.–May.

Similar species: (1) See Wolfberry. (2) Tartarian Honeysuckle (Plate 14) is more eastern and has 3 bundle scars.

WOLFBERRY **Not illus.**
Symphoricarpos occidentalis Hook.

Recognition: Like Snowberry but with leaves larger and somewhat leathery, often wavy-edged. Twigs usually slightly hairy. Flowers *without stalks.* Fruits greenish white, becoming dark; seeds less than 3/16″ long. Plains and rocky places; Ontario and British Columbia to New England, Pennsylvania, n. Illinois, Missouri, Kansas, and New Mexico.

KALM ST. JOHNSWORT *Hypericum kalmianum* L. **p. 110**

Recognition: A small shrub whose leaves have *many tiny transparent dots* when held up to light and viewed through a hand lens. *Clusters of leafy shoots* often present in leaf-angles. Leaves more or less hairless, somewhat oblong. Branchlets *4-edged,* twigs *2-edged.* Twigs angled at leaf scars. No scales present at twig bases. Older bark *papery* and shreddy. Buds very small, with 2 scales. Leaves 1″–2″. Height to 3′. Flowers bright yellow, with 5 petals and 5 sepals, clustered at twig ends, July–Sept. Fruits small, dry 5-parted (rarely 3, 4, or 6) capsules, 5/16″–7/16″ long (not counting slender projecting tips), Sept.–Oct.

Similar species: Related (1) St. Andrew's Cross and (2) St. Peterswort (Plate 12) also have dotted leaves but are lower creeping or reclining shrubs, with only 4 petals and sepals. (3–5) The next 3 St. Johnsworts have 2-angled branchlets. Single bundle scars, papery bark, and tiny buds are helpful in winter in separating St. Johnsworts from other plants with opposite leaf scars.

SHRUBBY ST. JOHNSWORT **p. 110**
Hypericum spathulatum (Spach) Steud.

Recognition: Similar to Kalm St. Johnswort but more widespread and with *2-angled* branchlets and twigs. Leaves narrowly oblong, 1″–3″. Height to 7′. Flowers ⅝″–1″, in clusters at twig ends and in upper-leaf angles. The 5 green sepals underlying the 5 yellow petals are *shorter than petals* (¼″–1¼″). Fruits 3-parted, ⅜″–⅝″.

Similar species: (1) Golden St. Johnswort has larger flowers, longer sepals. (2) Dense St. Johnswort has smaller flowers, shorter sepals and fruits.

GOLDEN ST. JOHNSWORT **Not illus.**
Hypericum frondosum Michx.

Recognition: Resembles Shrubby St. Johnswort but south-midwestern. Flowers 1″–1⅝″. Green sepals underlying yellow petals are *longer* than the petals (⅞″–1⅜″). Fruit capsules ⁵⁄₁₆″–⅝″. Limestone soils; S. Carolina, Kentucky, and s. Indiana to Alabama and Texas.

DENSE ST. JOHNSWORT **Leaf illus., p. 110**
Hypericum densiflorum Pursh

Recognition: Like Shrubby St. Johnswort but with *narrow* or oblong leaves, and flowers ½″–1¹¹⁄₁₆″, in *side clusters.* Green sepals underlying yellow petals are *shorter* than the petals (less than ¼″). Fruits ¼″ or less. Var. *lobocarpum* (Gattinger) Svenson has 4- to 5-parted fruits but reaches our area only in se. Missouri. Height to 6′. Wet areas; se. New York, West Virginia, s. Indiana, and s. Missouri to Florida and Texas.

CANADA BUFFALOBERRY **p. 110**
Shepherdia canadensis (L.) Nutt.

Recognition: A northern shrub with twigs and leaf undersides covered with *mixed brown and silver or white scales.* Leaves elliptic, green above, not leathery, often somewhat hairy. Small leaves may be present at bases of leafstalks. Twigs and branchlets not angled, no scales present at twig bases, bark *not papery.* Buds 2-scaled, with narrowed bases. Leaves 1″–1½″. Height 3′–7′. Flowers small, greenish yellow, bell-shaped, clustered, April–June. Fruits yellow or reddish, berrylike, July–Sept.

Similar species: Only opposite-leaved plant with brown and silver scales. (1) Silver Buffaloberry has only silver scales. (2) Beautyberry (p. 89) has gray-scaly twigs. Silverberries (Plate 68) have brown and silver scales but leaves are alternate.

Remarks: Fruits, sometimes known as soapberries, contain bitter substance that foams in water. Indians are said to have enjoyed sweetened "soapberry" suds. Fruits eaten by several songbirds. Nitrogen-fixing bacterial root nodules present, contrary to pattern for most plants that are not members of the pea family.

SILVER BUFFALOBERRY **Not illus.**
Shepherdia argentea Nutt.

Recognition: Similar to Canada Buffaloberry but more western and with *silver scales only.* Leaves somewhat wedge-shaped, silvery on *both sides.* Plant may be rather thorny. Fruits *bright red,* edible. Streambanks; Manitoba and Alberta to Iowa, w. Kansas, and n. New Mexico.

SANDMYRTLE *Leiophyllum buxifolium* (Berg.) Ell. **p. 110**

Recognition: A low but upright shrub of limited range. Leaves small, elliptic, leathery, *evergreen.* Most leaves opposite, some may be alternate. Older bark papery and *shreddy.* Twigs and branchlets not angled, no scales present at twig bases. Leaves ¼″–½″. Height to 2½′. Flowers small, white, clustered, petal entirely separate, April–June. Fruits dry, 2- to 3-parted capsules.

Similar species: (1) Alpine-azalea and (2) Pachistima (Plate 12) have smaller leaves and are mat-forming, not upright. (3) Sheep and (4) Pale Laurels (Plate 16) have larger, less crowded leaves.

Plants with Opposite or Whorled Heart-shaped Leaves That Are Not Toothed

(*Plate 18, p. 112*)

With the exception of 1 or 2 honeysuckles (Plate 14) that may bear a few leaves of this type, only these woody plants in our range have opposite or whorled heart-shaped leaves that are not toothed. The twigs of these plants lack central end buds but the tree species are even more easily differentiated in winter from all others with opposite leaf scars by the elliptical series of tiny bundle scars within each circular leaf scar. The lilac is a shrub. The other species here discussed are the only plants with opposite simple leaves of any type which grow to tall tree size. Flowering Dogwood (Plate 15) and blackhaw viburnums (Plate 20) are smaller in size. Two shrubby viburnums (Plate 20) bear leaves regularly triangular or heart-shaped and a 3rd species is somewhat heart-shaped (Plate 21), but they are toothed. The leaves of the toothed hydrangeas are rarely heart-shaped.

COMMON LILAC *Syringa vulgaris* L. **p. 112**

Recognition: A hairless European shrub with leaves *heart-*

shaped and long-pointed. Buds stout, green or reddish with 2–3 thick scales. Twigs rather slender, rarely moderately stout. Leaf scars have single bundle scars. Leaves 2″–3½″. Height to 10′. Flowers small, *densely clustered, purple or white,* May–June. Fruits small capsules.
Similar species: No other shrub has heart-shaped leaves and single bundle scars. In winter see Fringe-tree (Plate 16).

PERSIAN LILAC *Syringa persica* L. **Not illus.**
Recognition: Similar to Common Lilac but with slender, long-pointed leaves tapering at the base. Escapes rarely from cultivation.

PRINCESS-TREE *Paulownia tomentosa* (Thunb.) Steud. **p. 112**
Recognition: A medium-sized oriental tree with *large paired heart-shaped* leaves, chambered or hollow pith, and *clusters of large nutlike fruits or husks.* Leaves velvety-hairy beneath, usually short-pointed, sometimes only with shallowly heart-shaped bases, not whorled. Twigs stout, leaf scars circular, bundle scars numerous. Trunk bark rough with interlaced, smooth, often shiny, areas. Leaves 6″–13″. Height 30′–60′; diameter 1′–2′. Flowers about 2″, purplish with yellow stripes inside, in large clusters, buffy spikes of next years' flowers present after autumn, April–May. Fruits 1¼″–1¾″, somewhat *pecan-shaped woody capsules* containing many small winged seeds; husks present all winter.
Similar species: Catalpas have solid white pith, sometimes whorled leaves, and long slender fruit capsules.

COMMON CATALPA *Catalpa bignonioides* Walt. **pp.** *6,* **112**
Recognition: Similar to Princess-tree but with solid whitish pith and *cigar-shaped* fruits. Leaves paired or in whorls of 3, hairy beneath; have somewhat foul odor when crushed. Trunk bark scaly. Leaves 6″–13″. Height 50′–60′; diameter 1′–4′. Flowers 1″–1⅝″, white with yellow and purple spots, clustered, lower petal not notched, May–July. Fruits long slender pods containing many small seeds, Sept.–winter.
Similar species: (1) Princess-tree has chambered pith. (2) Catawba-tree has more long-pointed leaves and flowers with lower petal notched. (3) Chinese Catalpa has hairless short-pointed leaves, yellow blossoms.
Remarks: Once widely planted for fence posts, its rapid growth unfortunately is often counteracted by insect, storm, and frost damage. Often highly productive of "catawba worms" for fish bait.

CATAWBA-TREE *Catalpa speciosa* Warder **Not illus.**
Recognition: Resembles Common Catalpa but larger, with *long-pointed* leaves that are not foul-odored when crushed. Trunk bark deeply ridged. Height 50′–70′ (120′); diameter 2′–4′ (5′).

Flowers 1⅜″–2″, lower petal notched, May–June. Wet woods; e. Virginia, Ohio, s. Illinois, and Kansas to Louisiana and e. Texas.

CHINESE CATALPA *Catalpa ovata* G. Don **Not illus.**
Recognition: A shrub or small tree generally like preceding 2 species but with leaves *hairless,* or quickly becoming so, and short-pointed. Twigs and fruits more slender. Flowers yellow, marked with orange and purple, June–Aug. Escaped from cultivation; Connecticut and s. Ontario to Maryland and Ohio.

Miscellaneous Shrubs with Opposite Toothed Leaves

(*Plate 19, p. 114*)

Surprisingly few plants have opposite simple leaves that are toothed. Several nonerect species are on Plate 12. The maples (Plate 22) have toothed leaves but these are also deeply lobed. Only some viburnums (Plates 20 and 21) and plants of this plate have leaves of this type. Many species have only limited northern ranges. Oakleaf Hydrangea (not illustrated) is discussed here with its relatives even though its leaves are lobed.

NORTHERN BUSH-HONEYSUCKLE **p. 114**
Diervilla lonicera Mill.
Recognition: A low shrub with *slender ridged* twigs and scales present at the *twig bases.* Leaves more or less egg-shaped, *long-pointed,* fine-toothed. Typically nearly hairless but a northwestern variety (*hypomalaca* Fern.) has leaves densely hairy beneath. Leaves distinctly stalked. Twigs have slender ridges running downward from lines connecting leaf scars. Buds have 4 or more pairs of scales; bundle scars 3. Leaves 2″–5″. Height to 4′. Flowers yellow to crimson, tubular with spreading petal tips, ⅜″–⅝″, June–Aug. Fruits long-pointed dry capsules.
Similar species: Though honeysuckles (Plate 14), Coralberry and relatives (Plate 17), and hydrangeas (below) also have scales present at twig bases, the ridged twigs of this species are distinctive. Southern Bush-honeysuckle has short leafstalks. True honeysuckles have leaves not toothed, fleshy fruits. Certain of the unrelated and dissimilar azaleas (Plate 64) sometimes are called bush-honeysuckles.

SOUTHERN BUSH-HONEYSUCKLE **Not illus.**
Diervilla sessilifolia Buckl.
Recognition: Like the preceding but leafstalks *extremely short*

and twigs distinctly *4-sided.* Mountains; w. Virginia and e. Tennessee to nw. Georgia and n. Alabama.

WILD HYDRANGEA *Hydrangea arborescens* L. **p. 114**

Recognition: A low to medium-sized shrub with smooth and medium-stout twigs that are not ridged but have scales *present* where they meet branchlets. Leaves large-toothed, very variable. They may be pale green and hairless or fine white-hairy beneath; nearly circular, heart-shaped, egg-shaped, elliptic, or long-pointed. Leaves and leaf scars may be in whorls of 3. Buds have 4 or more pairs of scales; bundle scars 3. Bark of branchlets thin, papery, glossy. Leaves 5″–15″. Height to 6′ (10′). Flowers whitish, small, in *flat-topped umbrella-shaped clusters,* outer flowers larger but sterile, June–July. Fruits small dry capsules, Oct–Dec., or longer.

Similar species: (1) Asiatic Hydrangea has cone-shaped flower and fruit clusters, hairy twigs. (2) Oakleaf Hydrangea has lobed leaves. Upright honeysuckles (Plate 14) have fleshy fruits, more slender twigs, less papery bark on branchlets. Bush-honeysuckles are more northern, have ridged twigs.

Remarks: Twigs recorded as poisonous to livestock, yet sometimes eaten by whitetail deer. Wild turkey eat fruits.

ASIATIC HYDRANGEA **Not illus.**

Hydrangea paniculata Sieb.

Recognition: Similar to Wild Hydrangea but with restricted range, hairy twigs, smaller leaves, cone-shaped flower and fruit clusters. Leaves 2″–5″. Swamps; scattered localities from Massachusetts southward.

OAKLEAF HYDRANGEA **Not illus.**

Hydrangea quercifolia Bartr.

Recognition: A southern species similar in some twig characteristics to the Wild Hydrangea but with deeply lobed, somewhat oaklike leaves that are white-hairy beneath. Twigs *very red-hairy.* Bark extremely flaky. Leaves 6″–8″. Flowers in cone-shaped clusters. Escaped from cultivation; north to Connecticut.

BURNINGBUSH *Euonymus atropurpureus* Jacq. **p. 114**

Recognition: A shrub or small tree with *green 4-lined* twigs. Leaves egg-shaped or elliptic, short-pointed, fine-toothed, somewhat hairy beneath. Twigs nearly round, buds scaly, bundle scars single, leaf scars not connected by lines. Leaves 2″–6″. Height 6′–12′ (25′). Flowers purple, clustered, June–July. Fruits *reddish and berrylike,* beneath *woody purplish* bracts, Aug.–Nov.

Similar species: Among opposite-leaved plants with single bundle scars only members of this genus have 4-lined twigs.

(1) Strawberry-bushes (Plate 12) are not erect, twigs are more square in cross section. (2) European Spindletree has hairless, smaller leaves, orange and pink fruits.
Remarks: Fruits reported to be poisonous to children. Recorded as eaten by only a few birds.

EUROPEAN SPINDLETREE **Not illus.**
Euonymus europaeus L.
Recognition: Similar to Burningbush but leaves smaller (1″–4″), undersides *hairless.* Fruits orange beneath pinkish bracts. Escape; waste places; north to Massachusetts and Wisconsin.

COMMON BUCKTHORN *Rhamnus cathartica* L. **p. 114**
Recognition: A European medium-sized to large shrub with twigs ending in *sharp spines.* Leaves elliptic, hairless, fine-toothed. A few may be alternate rather than opposite. Twigs dark and unlined, buds have several scales. Bundle scars 3, less commonly fused and single. No scales present at twig bases, leaf scars not connected by lines. Inner bark *yellow.* Leaves 1½″–2″. Height to 16′ (26′). Flowers small, greenish, clustered, May–June. Fruits dark and berrylike.
Similar species: Combination of thorn-tipped twigs and yellow inner bark is distinctive. Other buckthorns (Plate 58) have alternate leaves. The only other thorny opposite-leaved plants in our area are (1) Silver Buffaloberry (p. 84) and (2) Swamp Forestiera.

SWAMP FORESTIERA **p. 114**
Forestiera acuminata (Michx.) Poir.
Recognition: An occasionally thorny shrub or small tree. Buds *globular,* often more than 1 above each leaf scar. Leaves long-pointed at *both ends,* fine-toothed, often clustered. Leaf scars not connected by lines. Twigs hairless or slightly hairy; bundle scars single. Leaves 1½″–3″. Height to 12′ (25′). Flowers small, March–May. Fruits small, fleshy, May–Oct.
Similar species: (1) Only other plant with globose buds and single bundle scars is Buttonbush (Plate 16), which has leaves often whorled, leaf scars connected by lines, and buds single above leaf scars. Leaf shape of this species unique among shrubs with opposite toothed leaves. See (2) Upland Forestiera and, when thorniness is found, (3) Common Buckthorn.
Remarks: Fruits eaten by wood ducks, mallards, other waterfowl.

UPLAND FORESTIERA **Not illus.**
Forestiera ligustrina (Michx.) Poir.
Recognition: A species related to Swamp Forestiera that barely enters our area. Leaves somewhat egg-shaped, blunt-tipped,

rather hairy beneath. Flowers in Aug. Dry and rocky soils; Georgia and Kentucky to Florida and Alabama.

BEAUTYBERRY *Callicarpa americana* L. **Not illus.**
Recognition: A southern shrub with *gray-scaly* or gray-hairy twigs, *white-woolly* leaf undersides, and *violet-colored* fruit clusters. Leaves taper at both ends; buds silky-hairy with scales absent or smaller buds may have 2 scales. Buds have narrowed bases. Bundle scars single. Leaf scars not connected by lines. Leaves 3″–6″. Height to 5′. Flowers small, tubular, bluish, clustered, June–Aug. Fruits small, bright, purple, Aug.–Nov. In this group, only the buffaloberries (Plate 17) also have conspicuously scaly twigs. Their twigs are covered with silver and brown scales and bud scales are present on all buds. Woods; Maryland, Tennessee, Arkansas, and Oklahoma to Florida and Texas.

COMMON MOCK-ORANGE *Philadelphus inodorus* L. **p. 114**
Recognition: A southern shrub with buds small or hidden beneath leaf scars. Leaves egg-shaped, somewhat long-pointed, hairless or slightly long-hairy, have from a few tiny to many larger teeth. Leaf veins tend to parallel leaf edges. Bundle scars 3; leaf scars *connected by lines.* Twigs hairless, tips not thorny. Bark of branchlets papery. Leaves 2″–4″. Height to 10′. Flowers 1–4, white, to 2″ across, at twig ends, petals ¾″–1″, May–June. Fruits dry 3- to 4-parted capsules.
Similar species: (1) Only Flowering Dogwood also has 3 bundle scars and hidden buds. It, however, has raised leaf scars, tight bark. (2) Hairy Mock-orange has hairy twigs; other mock-oranges have 5–7 flowers in cluster.

HAIRY MOCK-ORANGE **Not illus.**
Philadelphus hirsutus Nutt.
Recognition: A similar but smaller species than Common Mock-orange with *hairy* twigs and *woolly* leaf undersides. Twigs red or straw-colored; older branchlets have flaking papery bark. Leaf scars narrower; buds *fully exposed.* Flower petals ⅜″–¾″. Rocky areas and streambanks; N. Carolina and Kentucky to Georgia and Alabama.

GARDEN MOCK-ORANGE **Not illus.**
Philadelphus coronarius L.
Recognition: Similar to Common Mock-orange but flowers 5–7 in clusters. Leaves *hairless* except on veins beneath. Flowers 1″–1⅜″ across and very fragrant, petals ⅜″–¾″. They are the "orange blossoms" frequently used ornamentally in the North. A European species, sometimes spreading from cultivation.

GRAY MOCK-ORANGE **Not illus.**
Philadelphus pubescens Loisel.

Recognition: Unlike other mock-oranges, the bark of branchlets of this species *tight*, not flaky. Furthermore, this bark is *gray*, not straw-colored or reddish. Leaves *gray-hairy beneath*. Flowers 5–7, but barely fragrant. Bluffs and riverbanks; Tennessee and s. Illinois to Alabama and Arkansas.

MARSH-ELDER *Iva frutescens* L. **Not illus.**

Recognition: A partly woody plant that grows on *sea beaches* and *salt marshes*. Leaves somewhat *thickened* and at least upper ones narrow to elliptic. Foliage hairless or fine-hairy, with 6–15 pairs of large coarse teeth. Twigs branched (see Sassafras, Plate 43), with fine lines running lengthwise. Buds hidden in bark. Leaves 3″–4″. Height to 11′. Flowers small, greenish white, in end clusters, Aug.–Oct. Fruits small, dry. Coastal saline soils; w. Novia Scotia to Florida and Texas.

Viburnums (1) and (2)

(*Plates 20 and 21, pp. 116, 118*)

Though widespread and common in eastern United States, viburnums are difficult to identify as a group. Few of the common names ordinarily include the word viburnum and no all-inclusive vegetative characteristics define the group. All viburnums, however, have small fleshy fruits containing single flat seeds. Usually the flowers are small and white. They and the fruits occur in mostly flat-topped clusters 3″–5″ across. Siebold Viburnum and a variety of Guelder-rose have round-topped flower heads. Hobblebush, Cranberry Viburnum, and Guelder-rose have some blossoms larger, more showy, and sterile. The bundle scars are 3.

The viburnums are readily divisible into 4 main groups according to bud and leaf type:

1. Leaves finely toothed or wavy-edged, not lobed (Plate 20):
  2. Buds without scales; leaves somewhat heart-shaped; leaf scars triangular **WAYFARING-TREE GROUP**
  2. Buds with 2 scales; leaves egg-shaped to elliptic; leaf scars narrow **BLACKHAW GROUP**
1. Leaves coarsely toothed, sometimes lobed; leaf scars narrow (Plate 21):
  3. Leaves with a single main midrib, not lobed; bud scales several **ARROWWOOD GROUP**
  3. Leaves with 3–5 main veins meeting near the base, often lobed; bud scales 2 or several **MAPLELEAF GROUP**

The true haws, or hawthorns (Plate 39), and the Deciduous Holly, or Possum-haw (Plate 61), should not be confused with the blackhaw viburnums.

Viburnums (1)

(*Plate 20, p. 116*)

WAYFARING-TREE *Viburnum lantana* L. **p. 116**

Recognition: An upright European shrub or small tree with egg- to heart-shaped fine-toothed leaves and naked buds. Leaf undersides, twigs, and buds covered with fine gray hair. Leaf scars broadly triangular. Leaves 2″–5″. Height to 12′ (20′). Flowers small, white, all alike, May–June. Fruits red to black, seeds have 3 grooves, Aug.–Sept.

Similar species: Hobblebush has larger leaves, rusty hair, and blossoms of 2 sizes. All other viburnums have scaly buds, larger leaf scars, and leaves not heart-shaped.

HOBBLEBUSH *Viburnum alnifolium* Marsh. **p. 116**

Recognition: Similar to but more straggling than Wayfaring-tree; *rusty-hairy* and with *larger* leaves. Branches reclining, often rooted near tips. Leaves may become less hairy with age. Leaves 4″–8″. Height to 10′. Flowers white or pink, *marginal ones large-petaled*, showy, and sterile; seeds have a single groove. Fruits Aug.–Sept., or longer.

SMOOTH BLACKHAW *Viburnum prunifolium* L. **p. 116**

Recognition: A shrub or small tree with short, stiff side twigs. Leaves elliptic to egg-shaped, with blunt or somewhat pointed (but not long-pointed) tips, sharply fine-toothed, dull-surfaced, hairless or slightly scaly beneath. Leafstalks not winged or with very narrow "wings." Foliage may become somewhat leathery. Buds 2-scaled, powder-covered, or brown-hairy. Leaf scars narrow. Trunk bark dark, divided into many small squarish blocks. Var. *bushii* (Ashe) P. & S., ranging from s. Illinois to Arkansas, has narrower leaves, winged leafstalks. Leaves 1″–3″. Height 6′–15′ (30′); diameter 2″–6″ (10″). Flowers small, clusters *without stalks*, April–May. Fruits blackish, Sept.–Oct.

Similar species: Five viburnums have 2-scaled hairy or powdery buds and leaves more or less elliptic and fine-toothed or not toothed: Smooth and (1) Rusty Blackhaws and (2) Nannyberry regularly have fine-toothed leaves; Rusty Blackhaw has red-hairy leaves and buds; Nannyberry has long-pointed leaves and large flower buds; (3) Northern and (4) Southern Wild-raisins have leaves often wavy-toothed or without teeth, large flower buds with scales not entirely covering the buds, and stalked

flower clusters. (5) Cranberry Viburnum and (6) Squashberry (Plate 21) have hairless buds with 2 scales. (7) For bark similarities, see Persimmon (Plate 68).
Remarks: Fruits eaten by foxes, bobwhites, and several songbirds. Some people also like them.

RUSTY BLACKHAW *Viburnum rufidulum* Raf. **p. 116**
Recognition: More southern and differing from Smooth Blackhaw in having side branches somewhat more *flexible.* Leaf undersides, leafstalks, buds, and often twigs *densely red-hairy.* Upper leaf surfaces *shiny* and foliage more leathery. Leafstalks *winged.* Leaves 1″–4″. Height 6′–18′ (40′); diameter 2″–10″ (18″).

NANNYBERRY *Viburnum lentago* L. **p. 116**
Recognition: A northern shrub or small tree with sharply fine-toothed and short- to rather long-pointed leaves. Leaves hairless or nearly so and somewhat egg-shaped to narrowly elliptic. Leafstalks winged. The brown or gray buds have rough-granular scales and are of 2 sizes; larger flower buds are *completely covered by the 2 scales.* Twigs rough-granular and side twigs flexible. Leaves 2″–5″. Height 9′–18′ (30′); diameter 1″–3″ (10″). Flowers small, clusters *not stalked,* May–June. Fruits blue-black, Aug.–Sept.
Similar species: Only viburnum with 2 bud scales whose leaves are regularly long-pointed. (1) Northern and (2) Southern Wild-raisins have larger buds not completely covered by scales.

NORTHERN WILD-RAISIN *Viburnum cassinoides* L. **p. 116**
Recognition: A northern shrub with leaves often not toothed and larger flower buds only partly covered by the 2 scales. Leaves narrow to egg-shaped and either fine-toothed or somewhat wavy-edged. Leaves *dull above,* not leathery, and may have short prolonged tip. Leafstalks winged. The larger flower buds have 2 rough-granular yellowish to brownish scales whose edges do not quite meet in centers. Twigs dull, somewhat scaly and flexible. Leaves 2″–5″. Height to 12′. Flowers small, clusters *stalked,* June–Aug. Fruits yellowish to blue-black, white-powdered, pulp sweet, Sept.–Oct.
Similar species: (1) Leaves of Nannyberry are always toothed and more long-pointed. (2) Southern Wild-raisin has more glossy leaves and twigs. (3) See also Smooth Blackhaw.
Remarks: Fruits edible. Dried leaves have been used as tea. Fruits eaten by ruffed and sharptail grouse, pheasant, European partridge, and several songbirds. Deer and rabbits browse twigs.

SOUTHERN WILD-RAISIN *Viburnum nudum* L. **p. 116**
Recognition: Differs from Northern Wild-raisin in being more

southern and in having *glossy, leathery* (but *nonevergreen*) leaves, *glossy* twigs, and *brown to reddish* buds. Leaves regularly wavy-edged, rarely fine-toothed, rounded or merely pointed at the tip. Height to 20′. Flowers May–July. Fruits with pulp often bitter, July–Oct.
Similar species: Devilwood (p. 79) has evergreen foliage with leafstalks not winged.

Viburnums (2)

(*Plate 21, p. 118*)

These viburnums may be divided into 2 groups: (1) the arrowwood viburnums, with rather egg-shaped coarse-toothed leaves whose buds have several scales (usually 2 pairs), and (2) the mapleleaf viburnums, with lobed, rather maplelike leaves whose buds either have 2 or several scales. All have narrow leaf scars.

NORTHERN ARROWWOOD p. 118

Viburnum recognitum Fern.

Recognition: A shrub with egg-shaped to round leaves that are *hairless* (or hairy only on veins beneath), with 4–22 pairs of coarse teeth. Leaves rounded or slightly heart-shaped at base and leafstalks mostly without stipules. Twigs *hairless,* often somewhat 6-sided and ridged. Buds have several scales. Leaves 2″–3″. Height to 15′. Flowers May–July. Fruits blackish, seed with a *shallow broad* groove, July–Sept.
Similar species: (1) Southern Arrowwood has hairy twigs; (2) Shortstalk and (3) Softleaf Arrowwoods have velvety leaves and twigs not ridged. (4) In winter, Mapleleaf Viburnum has non-ridged twigs.
Remarks: Fruits eaten by ruffed grouse and chipmunks. Shoots once used by Indians for arrow shafts.

SOUTHERN ARROWWOOD *Viburnum dentatum* L. p. 118

Recognition: Similar to the preceding but twigs *velvety-hairy* and leaves occasionally velvety-hairy beneath. From w. Pennsylvania and Tennessee to e. Missouri, var. *deamii* (Rehd.) Fern. has nearly hairless twigs. Seed has *deep narrow* groove. Height to 10′. Flowers June–Aug. Fruits Aug.–Nov.
Similar species: Hairy ridged twigs characterize the typical form. Hairless variety can best be distinguished from Northern Arrowwood by seed structure and locality.

SHORTSTALK ARROWWOOD p. 118

Viburnum rafinesquianum Schultes

Recognition: A low midwestern shrub. Leaves have *only 4–10 pairs* of coarse teeth, velvety-hairy beneath, at least when young, *heart-shaped at base.* Leafstalks, at least those near flowers, usually less than ¼″, short stipules near base. Twigs *hairless,* not ridged. Bark of stems dark gray, does not flake. Leaves 1″–3″. Height to 7′. Flowers May–June. Fruits purplish, seeds mostly with pair of shallow grooves, July–Sept.

Similar species: In summer the few-toothed leaves are unique among arrowwood viburnums. In winter the darker, nonpeeling bark will distinguish it from next species.

SOFTLEAF ARROWWOOD *Viburnum molle* Michx. **p. 118**

Recognition: A shrub with *light gray, flaking* older bark. Leaves broadly egg- to heart-shaped, short-pointed, *soft-hairy beneath, 20–30 pairs* of teeth. Small stipules may be present early in year on bases of leafstalks. Twigs *hairless* and not ridged. Leaves 1″–3″. Height to 13′. Flowers May–June. Fruits dark blue, the seeds with a single deep groove, June–Aug.

Similar species: No other arrowwood has hairy heart-shaped many-toothed leaves and none has older bark of this type.

SIEBOLD VIBURNUM **Not illus.**
Viburnum sieboldii Miq.

Recognition: A Japanese tree or shrub that has escaped from cultivation, Connecticut to e. Pennsylvania. Twigs *ashy-woolly.* Leaves shiny, *wedge-shaped,* and coarse-toothed. The only viburnum with *opposite-branched, round-topped* flower clusters, but see text p. 90 and under Guelder-rose (p. 95). Seeds have 1 deep groove.

CRANBERRY VIBURNUM (HIGHBUSH-CRANBERRY)
Viburnum trilobum Marsh. **p. 118**

Recognition: A tall shrub with *3-lobed* leaves that are variably hairy or hairless on both surfaces. Lobes tend to be long-pointed. Leafstalks bear *tiny dome-shaped glands* (use lens) near leaf base and small, somewhat blunt, paired stipules near the twigs. Twigs hairless. Bud scales 2. Leaves 2″–4″. Height to 17′. Flowers white, with those of outer border of cluster sterile and larger, cluster 1⅝″–3″ across, May–July. Fruits red, tart but edible, seed not grooved, Sept.–Oct.

Similar species: Long-pointed leaf lobes are distinctive. (1) Guelder-rose also has glands on leafstalk but these have concave surfaces (use lens). (2) Squashberry has short-lobed leaves that usually do not bear glands; in winter, Squashberry may be separated on basis of smaller size and more straggling growth. Other viburnums with 2 bud scales have hairy or powdery buds. Maples (Plate 22) lack leafstalk glands. True cranberries are low and creeping (Plate 32).

Remarks: People sometimes use the fruits as a substitute for true cranberries. Eaten by ruffed and sharptail grouse, pheasant, and songbirds. Extract of the bark used medicinally. Though usually called Highbush-cranberry, it seems desirable to use a common name showing proper relationship.

GUELDER-ROSE *Viburnum opulus* L. **Not illus.**
Recognition: European, frequently cultivated and sometimes escaping to the wild. Similar to Cranberry Viburnum but glands of leafstalks concave on top; leaf lobes less long-pointed. Stipules more slender and pointed and fruits more bitter. Snowballtree, a variety of this species (var. *roseum* L.), has a round-topped flower cluster, like Siebold Viburnum. *All* flowers are showy but sterile. A viburnum, not a rose.

SQUASHBERRY *Viburnum edule* (Michx.) Raf. **p. 118**
Recognition: A northern straggling shrub. Leaves with *3 short, often uneven lobes* or sometimes not lobed. Leaf teeth coarse and irregular. Leafstalks without stipules and generally without glands; if present, more likely to be on leaf base than on leafstalk. Twigs hairless. Bud scales 2. Leaves 2″–4″. Height 2′–5′. Flowers all fertile, cluster up to 1½″ across, May–Aug. Fruits yellow to red, seed not grooved, Aug.–Oct.
Similar species: See Cranberry Viburnum.
Remarks: Fruits make excellent jam. Also, are eaten by grouse and squirrels. Twigs browsed by moose and woodland caribou.

MAPLELEAF VIBURNUM *Viburnum acerifolium* L. **p. 118**
Recognition: A shrub. Leaves *3-lobed, velvety-hairy beneath,* yellow and black dots on undersides. Leaf bases and stalks without glands, but leafstalks do have small paired stipules. Twigs velvety. Bud scales several. The hairless variety *glabrescens* Rehd. occurs from Kentucky southward. Leaves 2″–5″. Height to 7′. Flowers all fertile, May–Aug. Fruits red, turning black or purple, rarely white, seed barely or not grooved, July–Oct.
Similar species: Only lobed-leaf viburnum with more than 2 bud scales per bud. (1) In winter, separated from Southern Arrowwood by lack of twig ridges. The southern hairless form distinguished in winter from (2) Softleaf Arrowwood by lack of gray flaking bark; from (3) Shortstalk Arrowwood by lack of grooved seeds.
Remarks: Twigs eaten by deer and rabbits, fruits by grouse.

Maples

(*Plate 22, p. 120*)

Maples are our only trees with opposite, fan-lobed leaves. Though the leaves of the lobed-leaved viburnums (Plate 21) somewhat resemble those of some small maples, viburnum leaves are either velvety-hairy or equipped with tiny warty glands on the stalks, or both. One maple, the Ashleaf Maple, bears opposite compound leaves and is pictured with the ashes (Plate 10). Maple flowers mostly are greenish, small, and clustered. The dry, double-winged fruits, known as "keys," are eaten by many birds and by squirrels.

The native maples are of great value for shade, ornament, lumber, and sugar. Porcupines sometimes eat the inner bark, and the twigs are a staple food of cottontail rabbit, snowshoe hare, whitetail deer, and moose.

STRIPED MAPLE (MOOSEWOOD) **p. 120**
Acer pensylvanicum L.

Recognition: A small slender northern tree with *green* bark vertically marked with *white stripes.* Leaves *3-lobed,* sometimes with 2 additional small lobes near base, lobes somewhat long-pointed. Foliage double-toothed, hairless, green on both sides. paler beneath. Twigs hairless, mostly greenish. Buds stalked, with 2 scales. Leaves 2″–10″. Height 5′–15′ (35′); diameter 1″–2″ (9″). Flowers in long clusters, May–June. Fruits June–Sept.

Similar species: (1) Mountain Maple has darker, unstriped bark, hairy twigs. (2) Cranberry Viburnum (Plate 21) is lower, with fleshy fruits and without greenish white-striped bark.

MOUNTAIN MAPLE *Acer spicatum* Lam. **p. 120**

Recognition: A small northern tree with bark dark or somewhat greenish, but *not* white-striped. Leaves 3- to 5-lobed, coarsely toothed, hairless or slightly hairy beneath. Twigs *velvety-hairy,* mostly greenish. Buds stalked and have 2 scales. Leaves 2″–10″. Height mostly under 20′. Flowers in long clusters, May–Aug. Fruits July–Oct.

Similar species: See Striped Maple.

SIBERIAN MAPLE *Acer ginnala* Maxim. **Not illus.**

Recognition: An Asiatic shrub or small tree; escaped locally from Maine and Connecticut to w. New York. Leaves 3-lobed, but buds not stalked and covered by several scales. Buds brown. Twigs hairless. Flowers and fruits in lengthened clusters.

RED MAPLE *Acer rubrum* L. **pp.** *7,* **120**

Recognition: A medium-sized tree with *smooth gray* young trunk bark and broken darker older bark. Leaves 3- to 5-lobed, *much whitened* and hairless or hairy *beneath.* Notches between leaf lobes relatively *shallow,* base of terminal lobe *wide.* Var. *trilobum* K. Koch has only 3-lobed or unlobed, rounded to wedge-shaped leaves. Twigs and buds *reddish,* the latter blunt and several-scaled. Extra buds may be present above some side leaf scars. Broken twigs do not have unpleasant odor. Leaves 2″–8″. Height 20′–40′ (100′); diameter 1′–2′ (4′). Flowers red, rarely yellow, in short clusters, March–May. Fruits reddish, May–July.

Similar species: Though variable, distinguished from (1) Silver Maple by shallow leaf notches, wide base of end leaf lobe, nonodorous twigs, and smoother trunk bark. Both Red and Silver Maples differ from (2) Sycamore Maple in having red buds and more coarsely toothed leaves. (3) A form of the Sugar Maple with whitened leaf undersides can be recognized by slender, pointed, brown buds. (4) Norway Maple has milky sap evident in broken leafstalk.

Remarks: Wood sometimes used for furniture.

SILVER MAPLE *Acer saccharinum* L. **p. 120**

Recognition: A tall tree with *grayish* older bark that tends to *flake,* leaving *brown spots.* Leaves *deeply 5-lobed* with base of terminal leaf lobe *narrowed.* Foliage *whitened,* sometimes hairy beneath. Twigs and buds as in Red Maple but broken twigs have *unpleasant odor.* Leaves 2″–10″. Height 40′–60′ (120′); diameter 1′–3′ (5′). Flowers greenish or reddish, short-clustered, Feb.–May. Fruits greenish or reddish, April–June.

Similar species: See Red Maple.

Remarks: Sap sweet but less sugary than that of Sugar Maple.

SYCAMORE MAPLE *Acer pseudo-platanus* L. **Not illus.**

Recognition: Like preceding 2 species, this European tree has leaves *5-lobed and whitened beneath.* Unlike these native species, however, Sycamore Maple leaves are more *wavy-edged* than sharply toothed. Furthermore, buds are *green* rather than red and only single buds occur above leafstalk or leaf scar. In winter, it most resembles Norway Maple but edges of opposing leaf scars *do not meet.* Sycamore Maple resembles Striped and Mountain Maples in having elongate flower and fruit clusters. Occasionally escapes from cultivation; open upland areas.

SUGAR MAPLE *Acer saccharum* Marsh. **pp.** *6, 7,* **120**

Recognition: A large tree with dark brown trunk bark marked with rough vertical grooves and ridges. Leaves mostly *5-lobed* with moderately deep notches between lobes. Foliage *pale green beneath* but an uncommon form has whitened leaf undersides. Leaves usually hairless but leaf undersides velvety in a s. Indiana, Illinois, and Missouri variety. Leaf edges firm and not drooping. Leafstalk bases not much enlarged, no stipules, or small ones that do not cover buds. Buds slender, sharp-pointed, brown. Side buds occur singly. Twigs glossy and reddish brown. Leaves 2″–10″. Height 40′–60′ (80′); diameter

1′–2′ (3′). Flowers yellowish, April–June. Fruits June–Sept. **Similar species:** (1) Black Maple has shallowly lobed leaves with drooping edges, larger stipules and leafstalk bases, and dull orange-tinged twigs. (2) Florida Maple has whitish-gray bark and often hairy twigs and leaf undersides. (3) See Norway Maple.

Remarks: One of our most valuable hardwood trees. Neither sap nor wood is separated commercially from those of Black Maple; both species supply maple syrup as well as birdseye, curly, blister, and plain lumber. Wood much used for furniture.

FLORIDA MAPLE *Acer barbatum* Michx. **Not illus.**

Recognition: Much like Sugar Maple but with *light gray* bark on younger trunks and branches which resembles that of Beech or Red Maple. Twigs and leaf undersides *velvety-hairy* but may sometimes be hairless. Stalks of male flowers only ⅝″–1″ rather than 1″–2″ as in Sugar and Black Maples. Bottomlands and slopes of Coastal Plain and Piedmont sections from se. Virginia to centr. Florida, west to e. Texas, and north in Mississippi Valley to se. Missouri.

BLACK MAPLE *Acer nigrum* Michx. f. **p. 120**

Recognition: Similar to Sugar Maple but with darker older bark and mostly *shallowly 3-lobed* leaves darker green and more hairy; edges tend to *droop*. Leafstalks enlarge abruptly at base and usually bear stipules large enough to enclose buds. Twigs duller, somewhat orange-brown. Wings of paired fruits more widely separated.

NORWAY MAPLE *Acer platanoides* L. **Fruit illus., p. 120**

Recognition: European; resembles Sugar Maple but has more leaf teeth. Its best field mark is *milky juice* of broken leafstalk (see also next species). Buds large (over 3⁄16″), green or reddish, and blunt. In winter, resembles Sycamore Maple but edges of opposing leaf scars meet on Norway Maple twigs. Buds of Red and Silver Maples are smaller and, unlike this maple, extra buds may be present above some leaf scars. Leaves 2″–8″. Height 40′–70′; diameter 1′–2′. Occasionally spreading from plantings to upland fields and hedgerows.

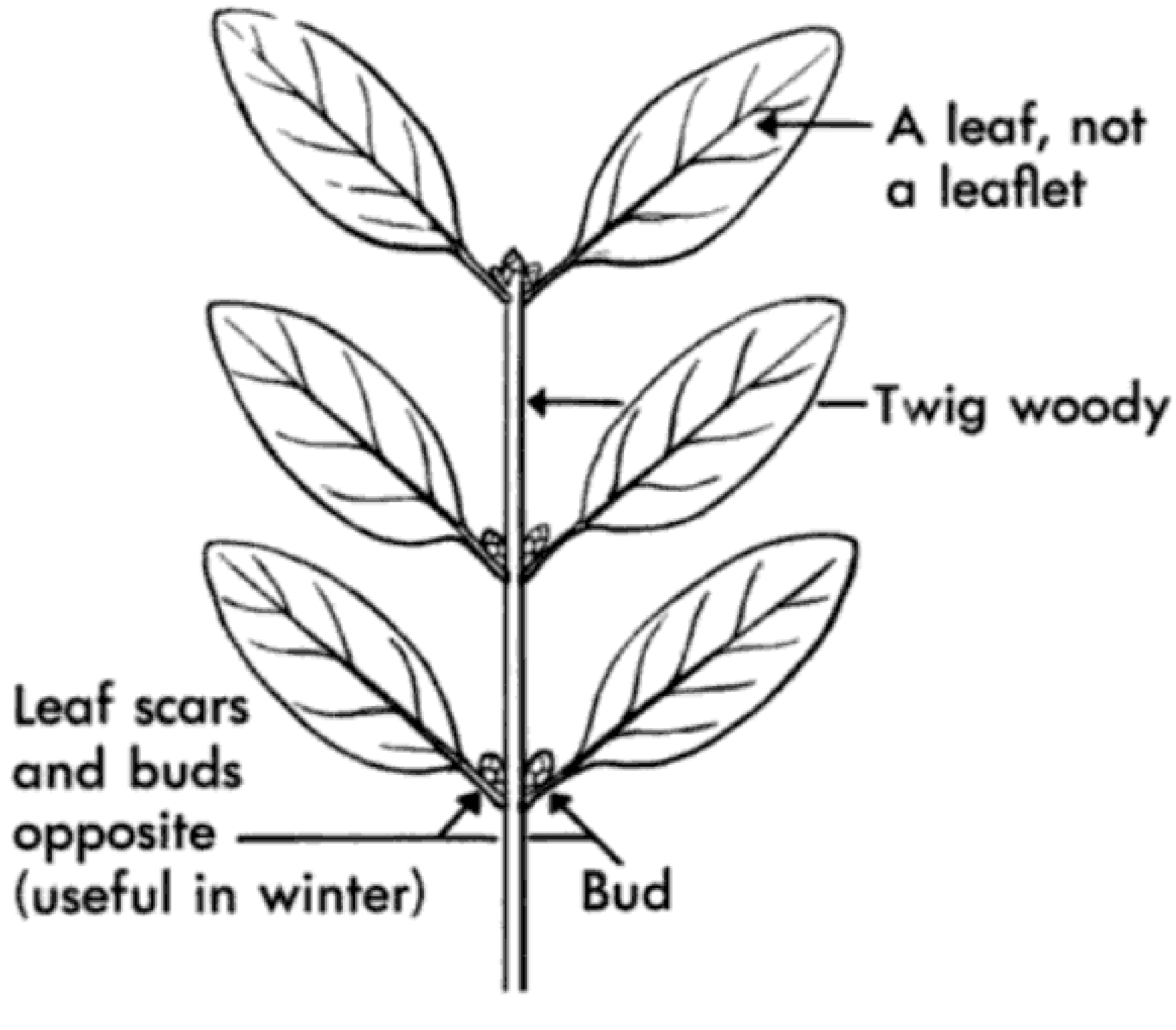
HEDGE MAPLE *Acer campestre* L. **Not illus.**

Recognition: Rarely found in wild, this European shrub or small tree has small leaves which have 3–5 rounded lobes that are not toothed. Sap of broken leafstalk *milky*. Leaf undersides, small gray buds, and twigs somewhat hairy. Branchlets may have corky ridges. See Norway Maple.

PLATES FOR SECTION III

Broad-leaved Plants with Opposite Simple Leaves

(*Key, pages 66–67; text, pages 66–98*)


A leaf, not a leaflet
Twig woody
Leaf scars and buds opposite (useful in winter)
Bud

Though more numerous than those of Section II, the plants with opposite simple leaves are still so few as to be rather easily identified. In winter, of course, plants with opposite leaf scars may be members of either Section II or III and the drawings in both Sections must be reviewed. Care should be taken that the leaves or leaf scars on the stubby, scar-crowded spur branches of some alternate-leaved plants are not thought to be opposite or whorled. No opposite-leaved plants have spur branches.

LOW CREEPING AND TRAILING SHRUBS

as distinguished from climbing vines and erect woody plants. The creeping stems often take root. American Mistletoe (a parasite on branches of broad-leaved trees), p. 69, is included here.

ψ ST. ANDREW'S CROSS, *Ascyrum hypericoides* p. 67
Sandy and rocky fields and woods; se. Massachusetts, Pennsylvania, Kentucky, s. Indiana, s. Illinois, and Kansas to Florida and Texas.

ψ ST. PETERSWORT, *Ascyrum stans* p. 68
Dry to moist woods and fields; se. New York, e. Pennsylvania, and Kentucky to Florida and Texas.

ψ AMERICAN STRAWBERRY-BUSH p. 68
Euonymus americanus
Fertile woods; se. New York, Pennsylvania, s. Illinois, Missouri, and Oklahoma to Florida and Texas.

ψ RUNNING STRAWBERRY-BUSH, *Euonymus obovatus* p. 68
Damp woods and thickets; w. New York, s. Ontario, and s. Michigan to Tennessee and Missouri.

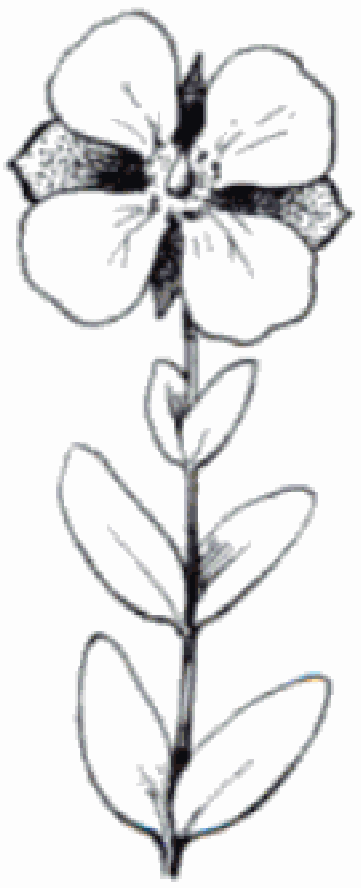
ψ PARTRIDGEBERRY, *Mitchella repens* p. 68
Forest floors; sw. Newfoundland, s. Quebec, and Minnesota to Florida and Texas.

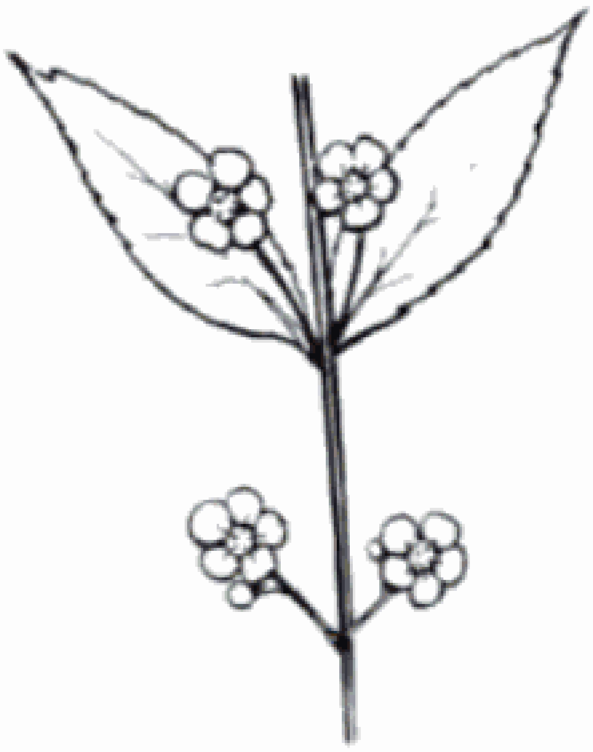
ψ TWINFLOWER, *Linnaea borealis* var. *americana* p. 68
Tundras, bogs, cool swamps; w. Greenland and Alaska to se. New York, w. Maryland, W. Virginia, ne. Ohio, n. Indiana, S. Dakota, Colorado, and n. California.

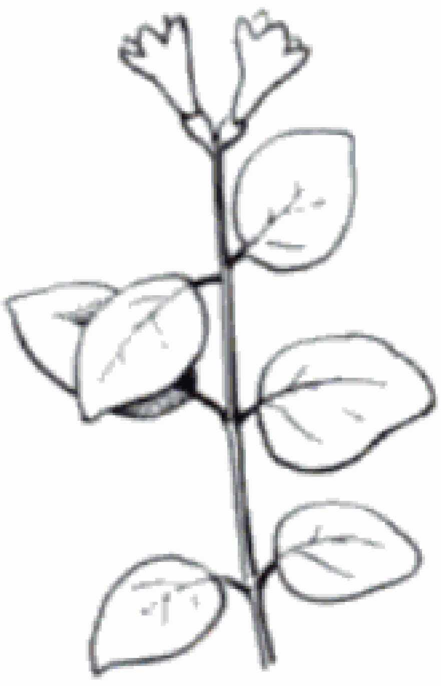
ψ ALPINE-AZALEA, *Loiseleuria procumbens* p. 69
Tundras and bogs; Greenland and Alaska to mts. of Maine, New Hampshire, and Alberta.

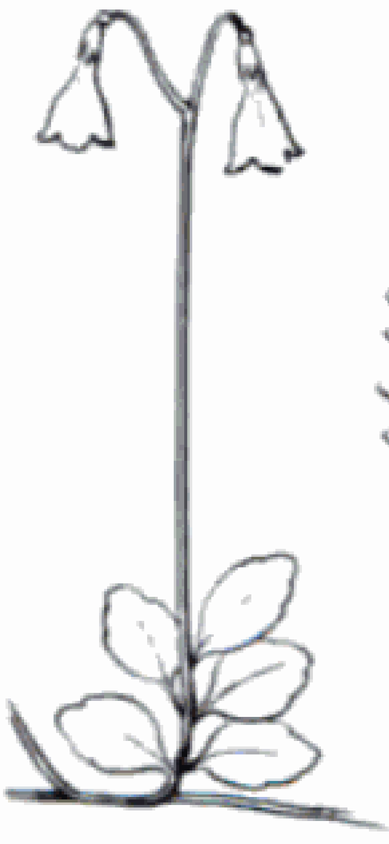
ψ PACHISTIMA, *Pachistima canbyi* p. 69
Rocky slopes; w. Virginia, W. Virginia, and se. Ohio.

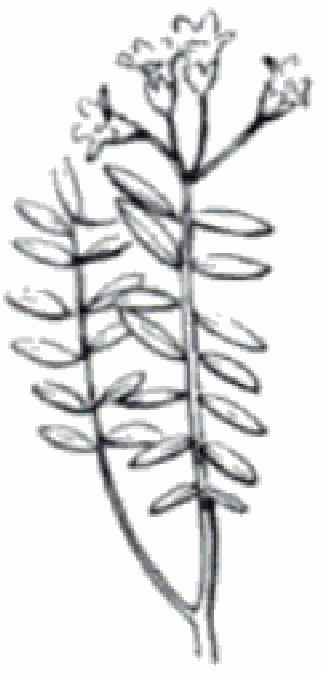
ψ AMERICAN MISTLETOE p. 69
Phoradendron flavescens (not illus.)

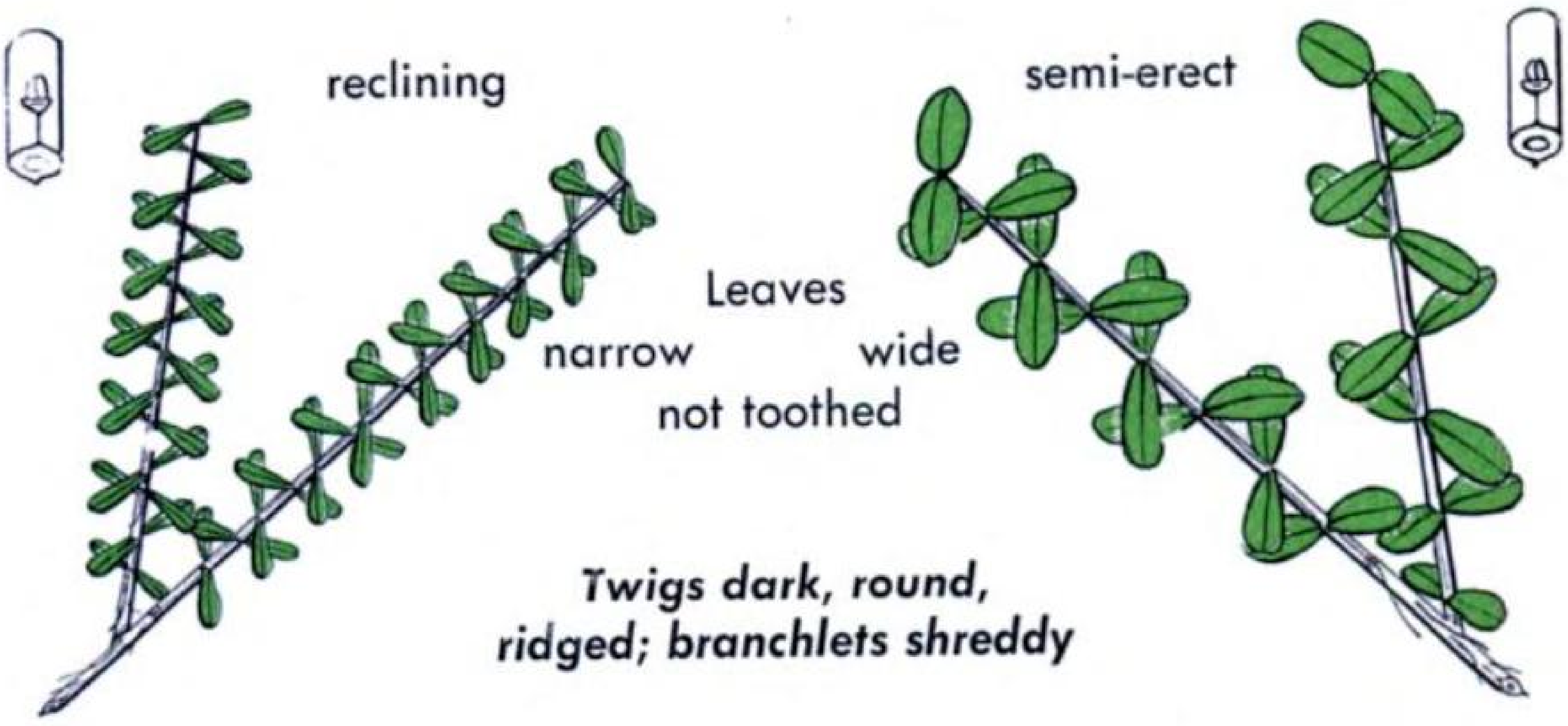

ST. PETERSWORT


STRAWBERRY-BUSH


PARTRIDGEBERRY


TWINFLOWER

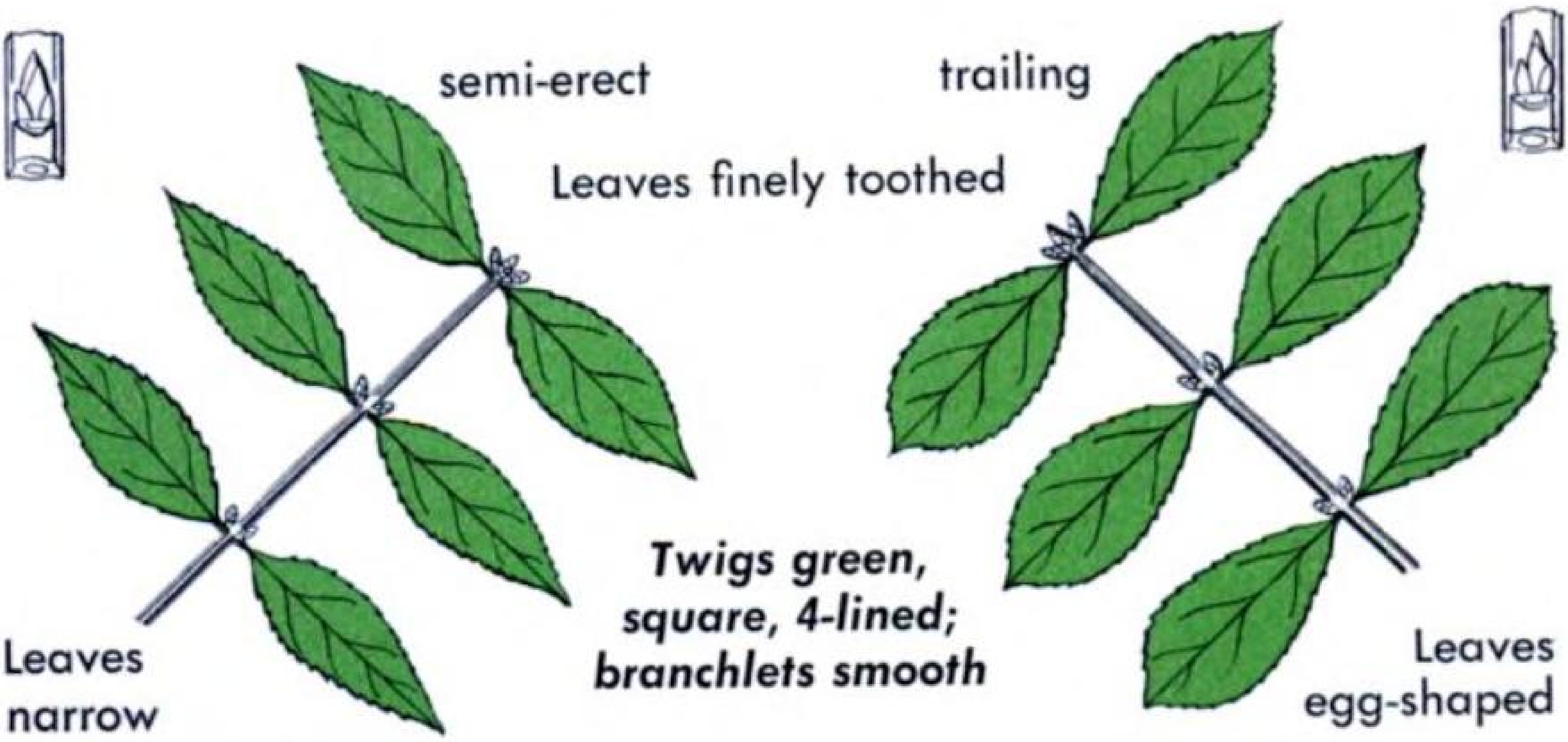

ALPINE-AZALEA


reclining
semi-erect
Leaves
narrow
wide
not toothed

Twigs dark, round, ridged; branchlets shreddy

ST. ANDREW'S CROSS

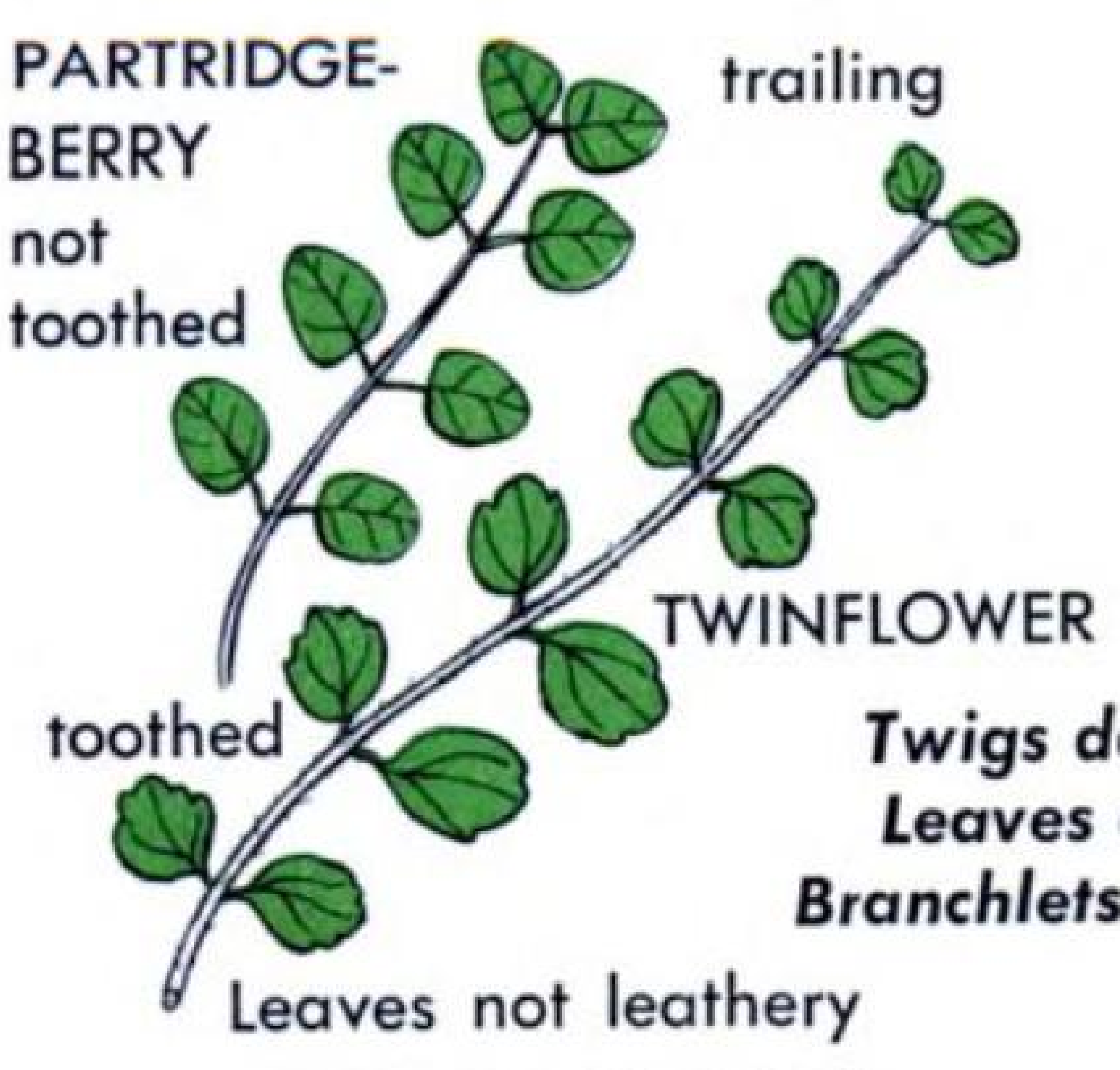
ST. PETERSWORT

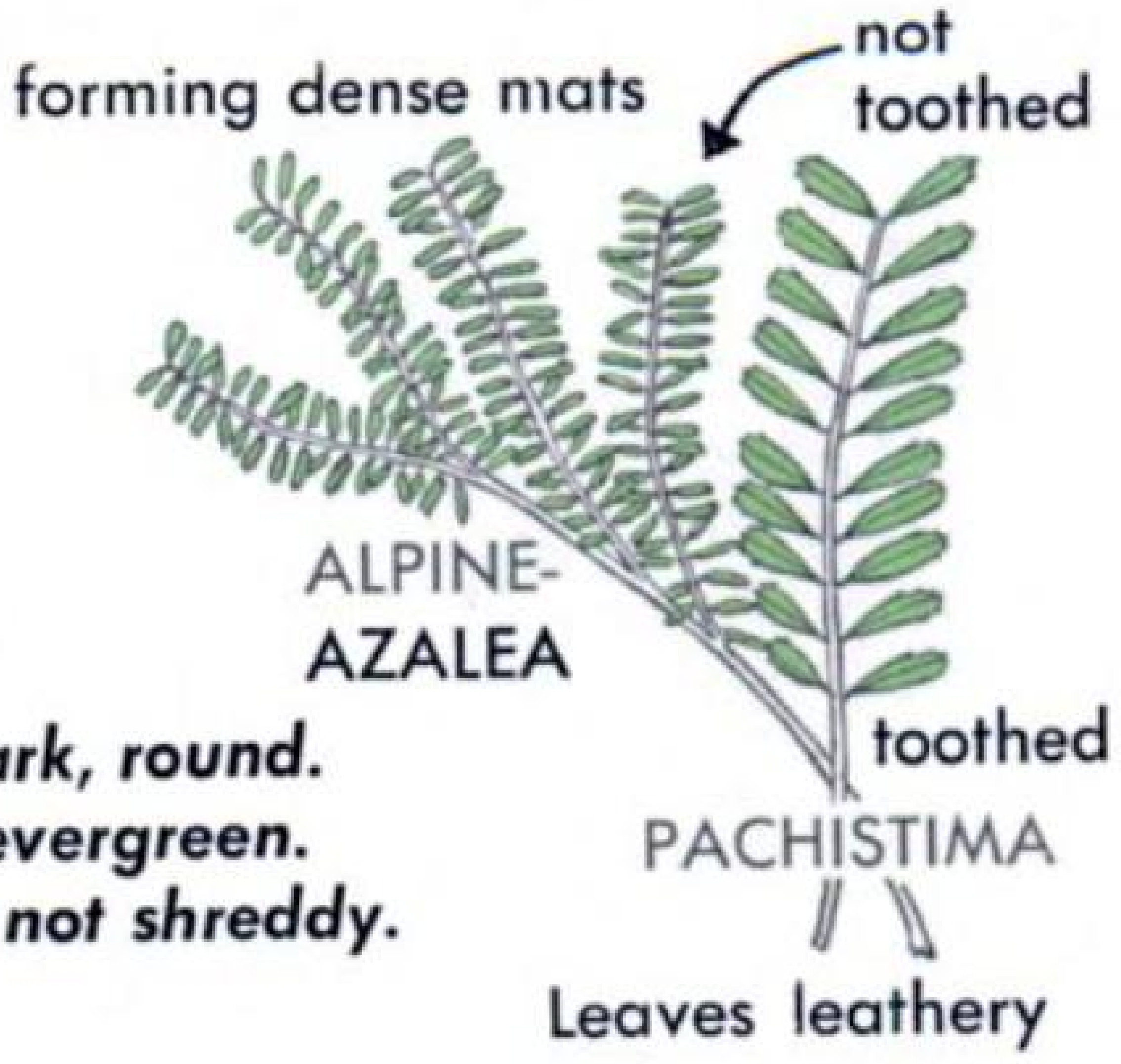

semi-erect
trailing
Leaves finely toothed
Leaves
narrow
Leaves
egg-shaped

Twigs green, square, 4-lined; branchlets smooth

AMERICAN STRAWBERRY-BUSH

RUNNING STRAWBERRY-BUSH


PARTRIDGE-
BERRY
not
toothed
trailing
TWINFLOWER
toothed
Leaves not leathery


forming dense mats
not
toothed
ALPINE-
AZALEA
toothed
PACHISTIMA
Leaves leathery

Twigs dark, round. Leaves evergreen. Branchlets not shreddy.

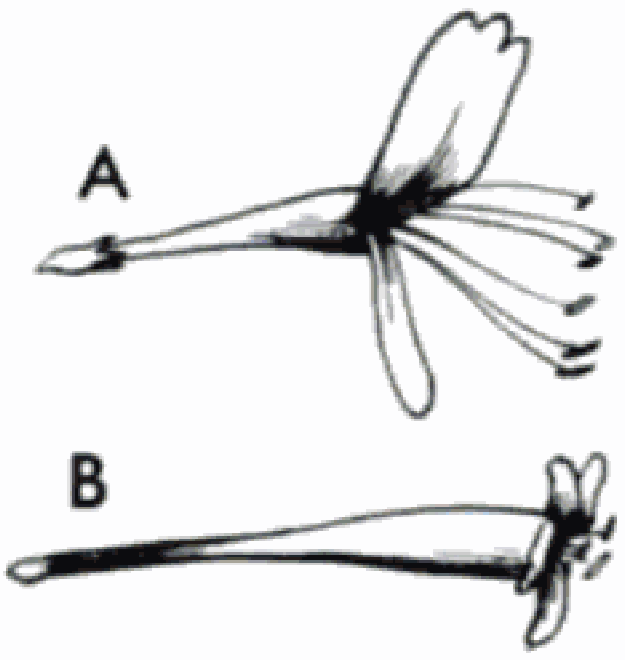
FOREST SHRUBS

ALPINE SHRUBS

HONEYSUCKLES (1) — VINES*

Climbing by twining stems only and leaves not toothed (but see Japanese Honeysuckle); bark papery; branchlets hollow; scales present at twig bases; opposing leaf scars connected by lines.

Flowers of these vines are of Type A, except for Trumpet Honeysuckle (B).



ʃ JAPANESE HONEYSUCKLE, *Lonicera japonica* p. 71
Woods and fields; Massachusetts, Ohio, Missouri, and Kansas to Florida and Texas.
ʃ WOODBINE HONEYSUCKLE p. 71
L. periclymenum (not illus.)

ʃ HAIRY HONEYSUCKLE, *Lonicera hirsuta* p. 71
Thickets and rocky soils; w. England, w. Quebec, and Saskatchewan to Pennsylvania, Ohio, Michigan, Minnesota, and Nebraska.

ʃ MOUNTAIN HONEYSUCKLE, *Lonicera dioica* p. 71
Dry thickets and woods; sw. Maine, s. Quebec, Manitoba, and British Columbia to Georgia and ne. Kansas.

ʃ ROCK HONEYSUCKLE, *Lonicera prolifera* p. 72
Rocky areas; e. Massachusetts, s. Ontario, and se. Manitoba to Tennessee, Arkansas, and e. Kansas.

ʃ YELLOW HONEYSUCKLE, *Lonicera flava* p. 72
Rocky areas; N. Carolina and Missouri to Georgia, Alabama, and Oklahoma.
ʃ PALE HONEYSUCKLE, *L. flavida* (not illus.) p. 72

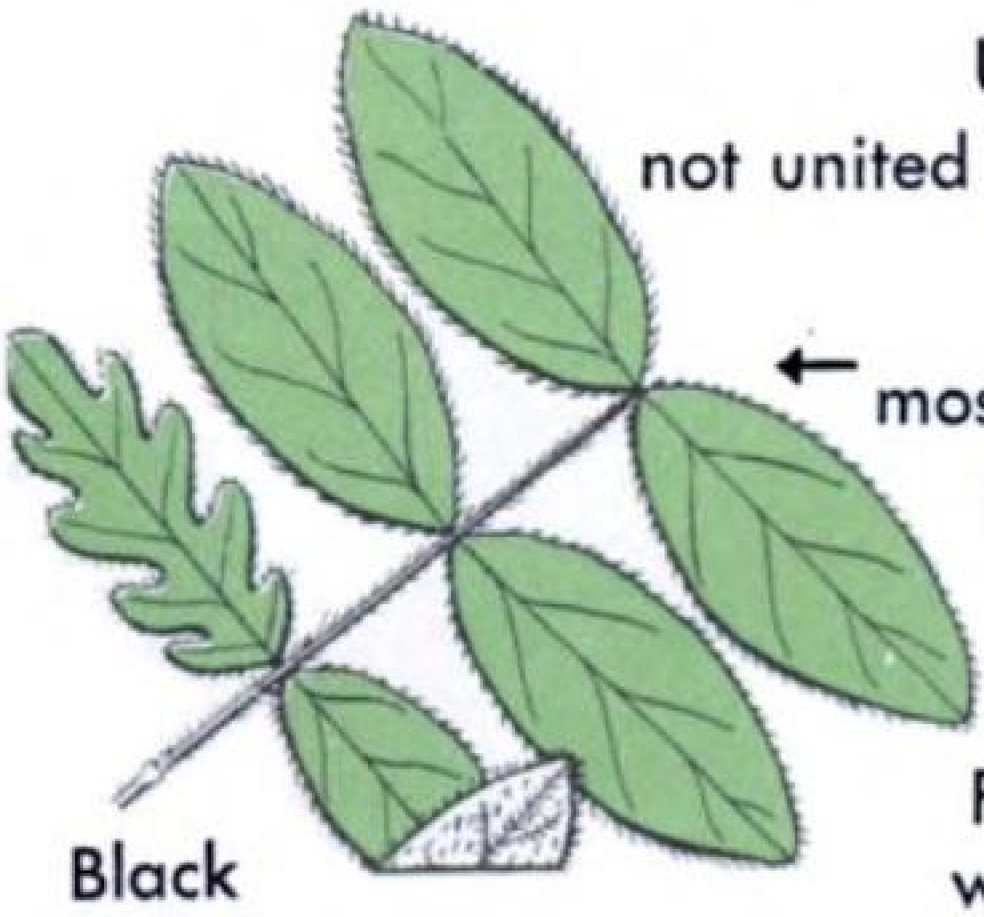
ʃ TRUMPET HONEYSUCKLE, *Lonicera sempervirens* p. 72
Woods; s. Maine, Iowa, and Nebraska to Florida and Texas.

***Four other vines* with opposite simple leaves, not honeysuckles, are treated in the text only. See Climbing Euonymus, Decumaria, False Jessamine, and Silkvine on page 70.

Twigs densely hairy; leaves hairy, green on both sides or purplish below (top 2 species)

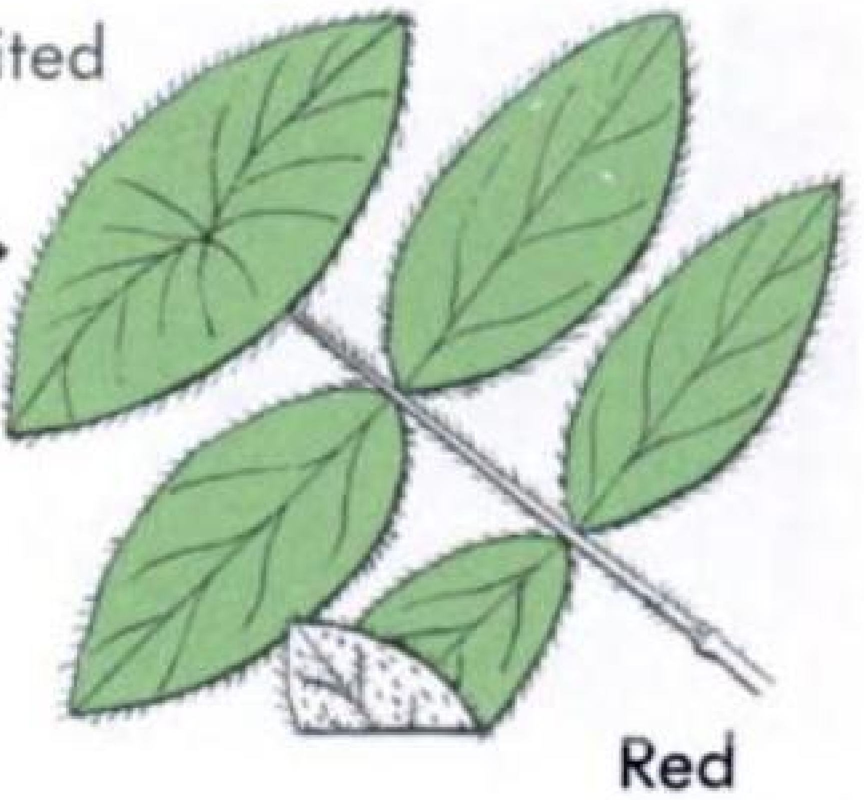
Upper leaves
not united   united
Leaves
← mostly   non- →
evergreen

Flowers ½″–1″,
white or yellow,
hairy inside



Black
berries

JAPANESE



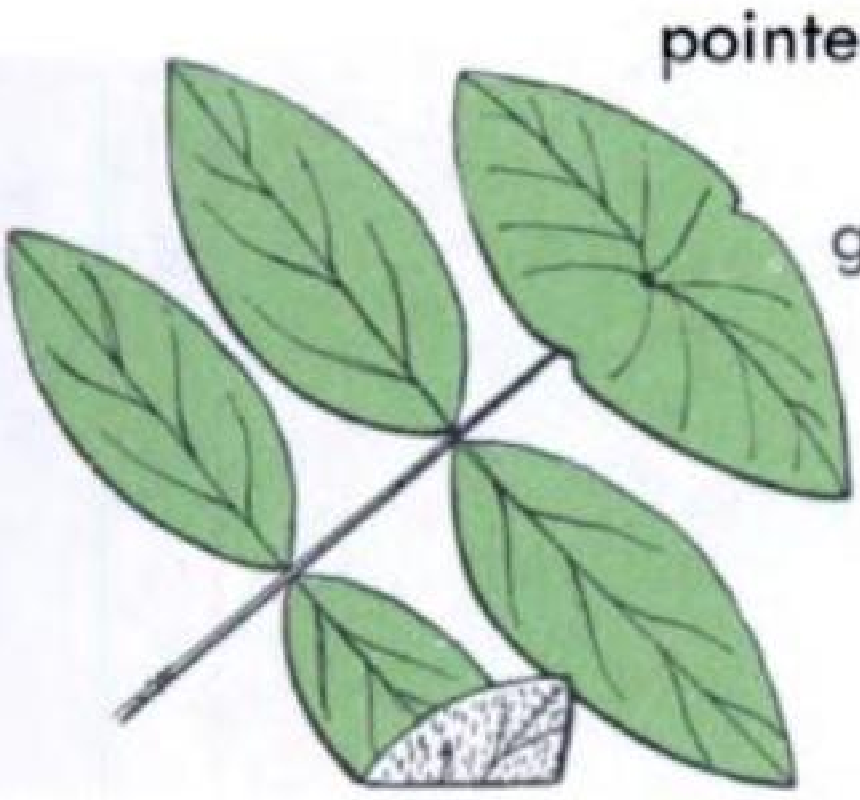
Red
berries

HAIRY

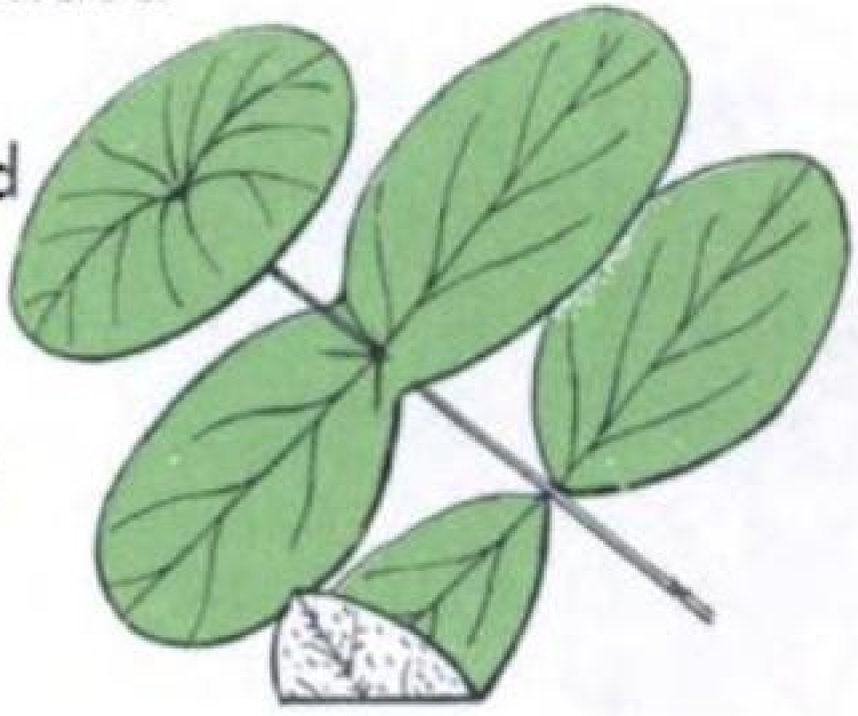
Twigs nearly hairless; leaves whitish beneath; upper leaves united; berries red (lower 4 species)

United leaves usually
pointed   rounded
Uppersides
green   whitened
Leaves
rather   nearly
narrow   circular
hairy (or not)

Flowers ½″–1″,
pale yellow,
hairy inside



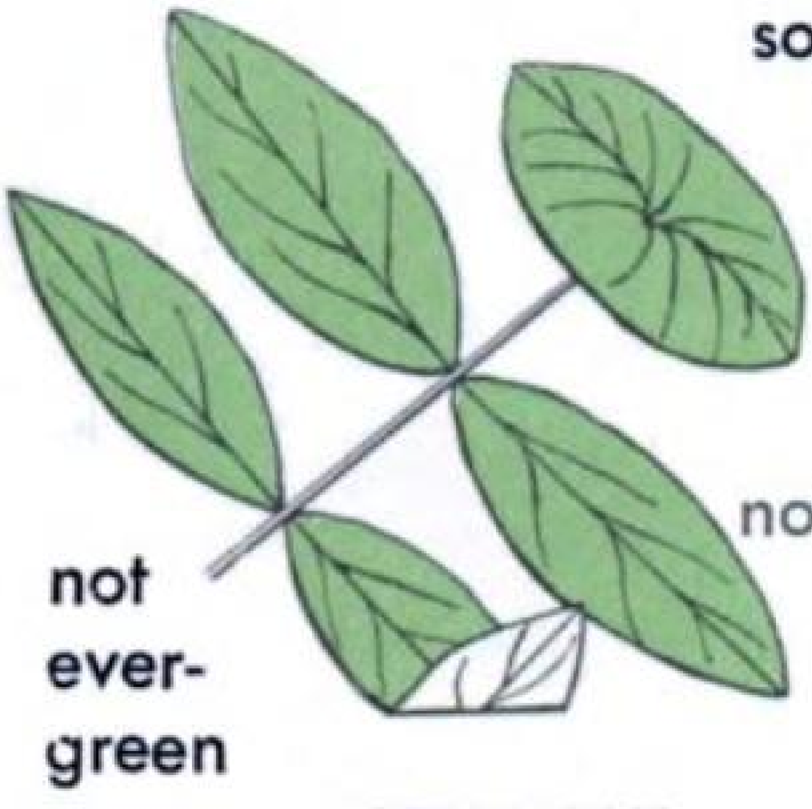
MOUNTAIN



ROCK

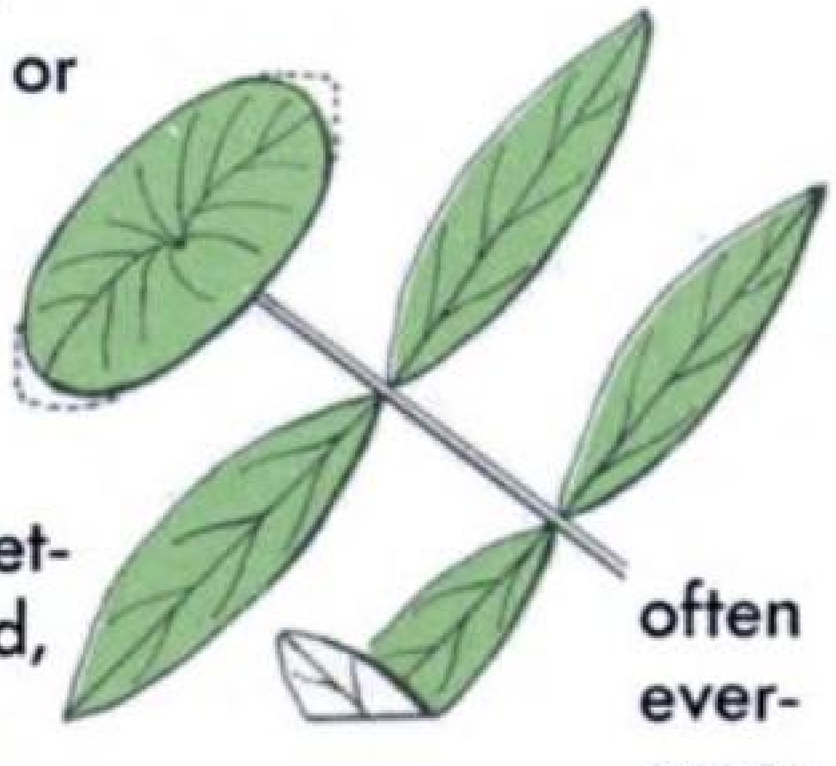
Tips of united leaves
somewhat   rounded or
pointed   pointed
Leaves hairless

Flowers 1¼″–2″,
not trumpet-   trumpet-
shaped,   shaped,
orange-   coral-
yellow   red



not
ever-
green

YELLOW



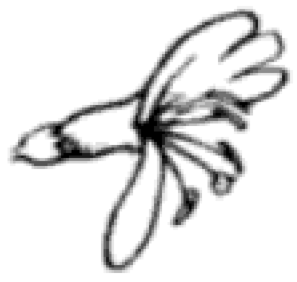
often
ever-
green

TRUMPET

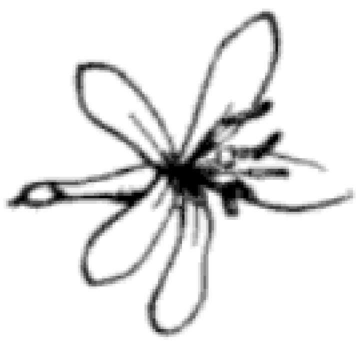
HONEYSUCKLES (2) — ERECT SHRUBS

Erect shrubs; leaves not toothed; bark papery; papery scales present at twig bases (see arrows); opposing leaf scars connected by lines.

Flowers



Type A



Type C

V TARTARIAN HONEYSUCKLE, *Lonicera tatarica* p. 73
Woods borders and thickets; New England, Quebec, and Ontario to New Jersey, Kentucky, and Iowa.

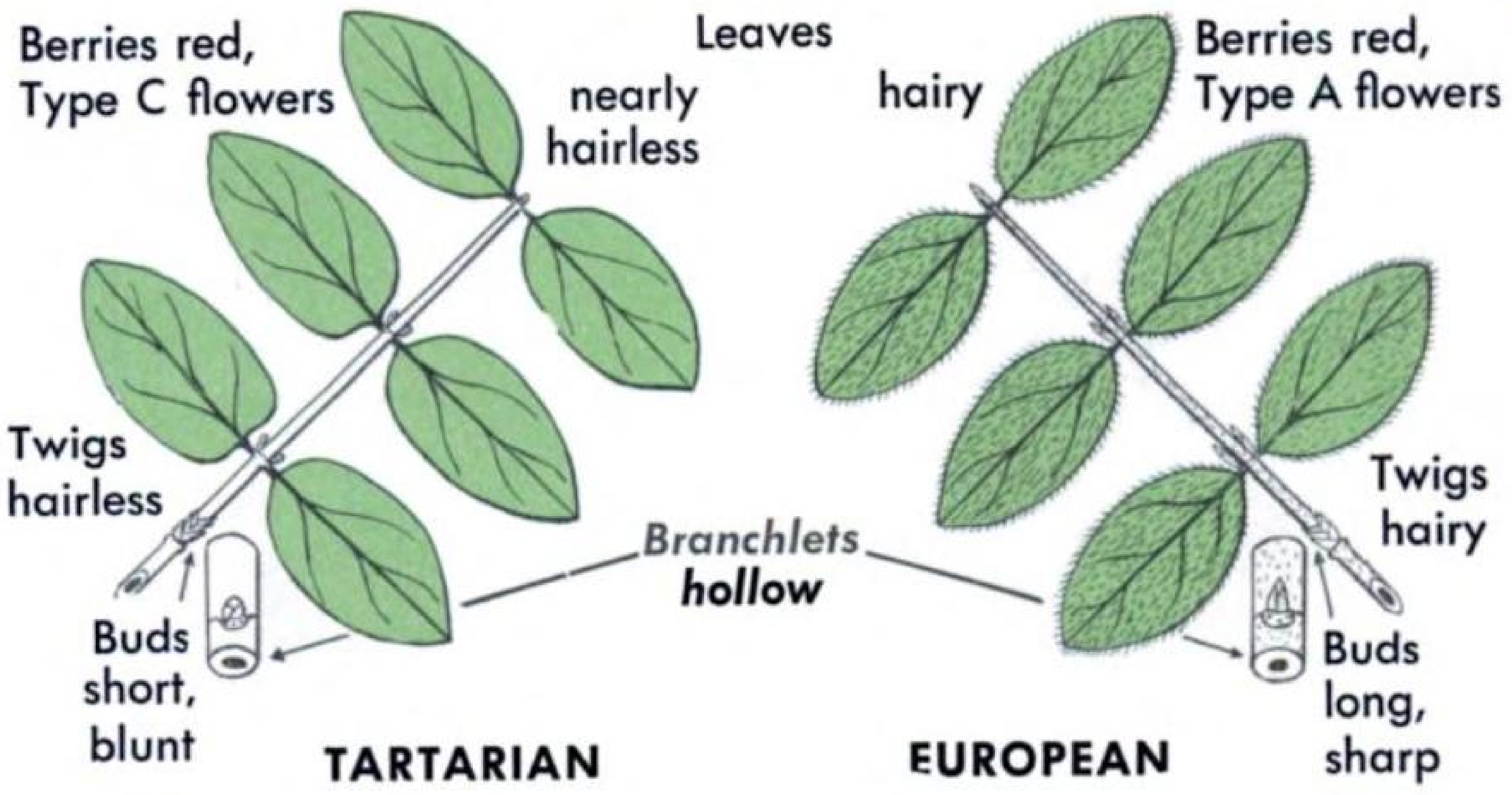
V EUROPEAN HONEYSUCKLE, *Lonicera xylosteum* p. 73
Escaped to thickets; New England and Michigan to New Jersey and Ohio.
  V MORROW HONEYSUCKLE, *L. morrowi* (not illus.) p. 73
  V BELLA HONEYSUCKLE p. 74
  L. morrowi Gray × *L. bella* Zabel (not illus.)

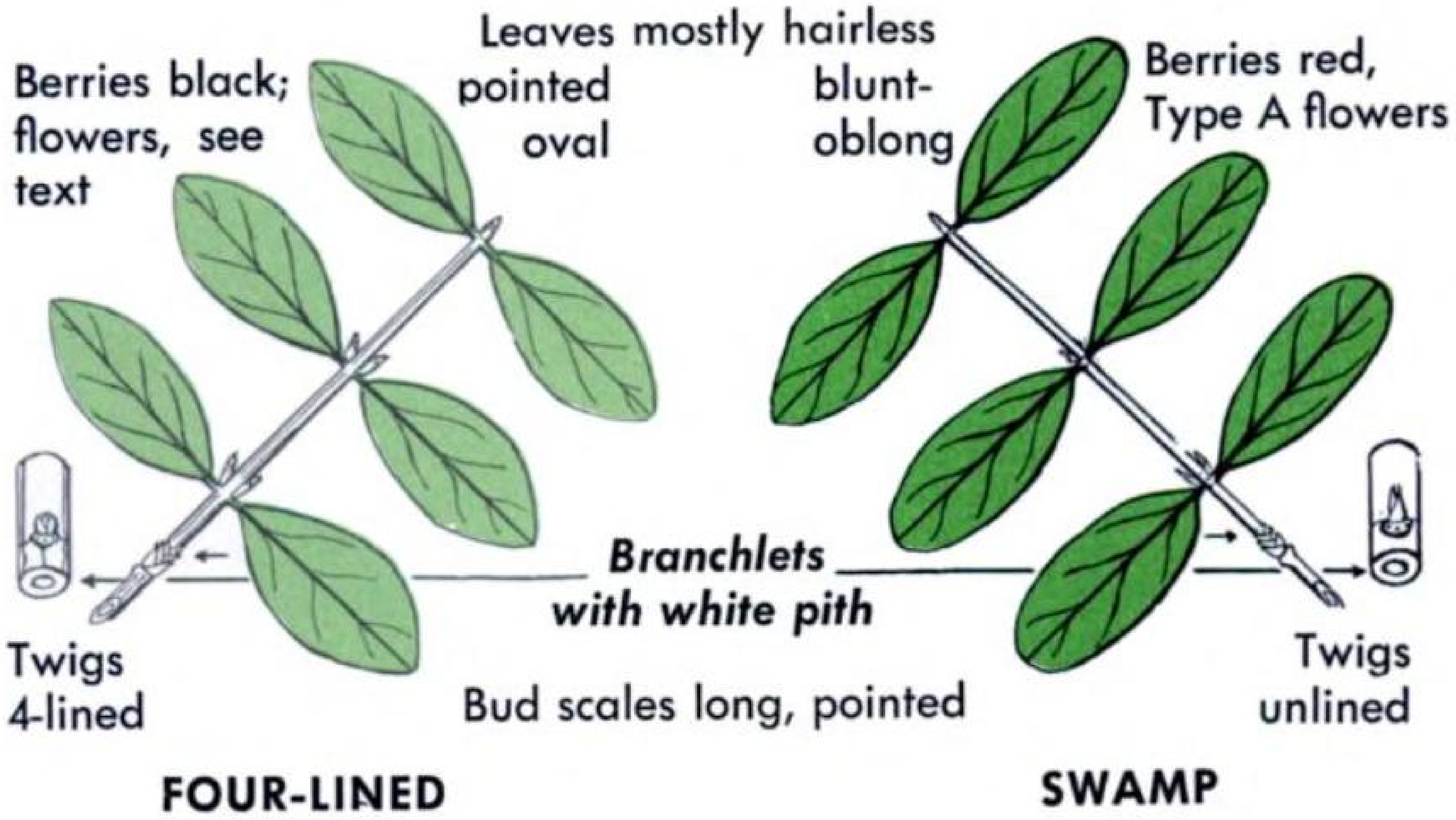
V FOUR-LINED HONEYSUCKLE, *Lonicera involucrata* p. 74
Moist woods; e. Quebec, w. Ontario, and Alaska to New Brunswick, Michigan, Wisconsin, and in the West.

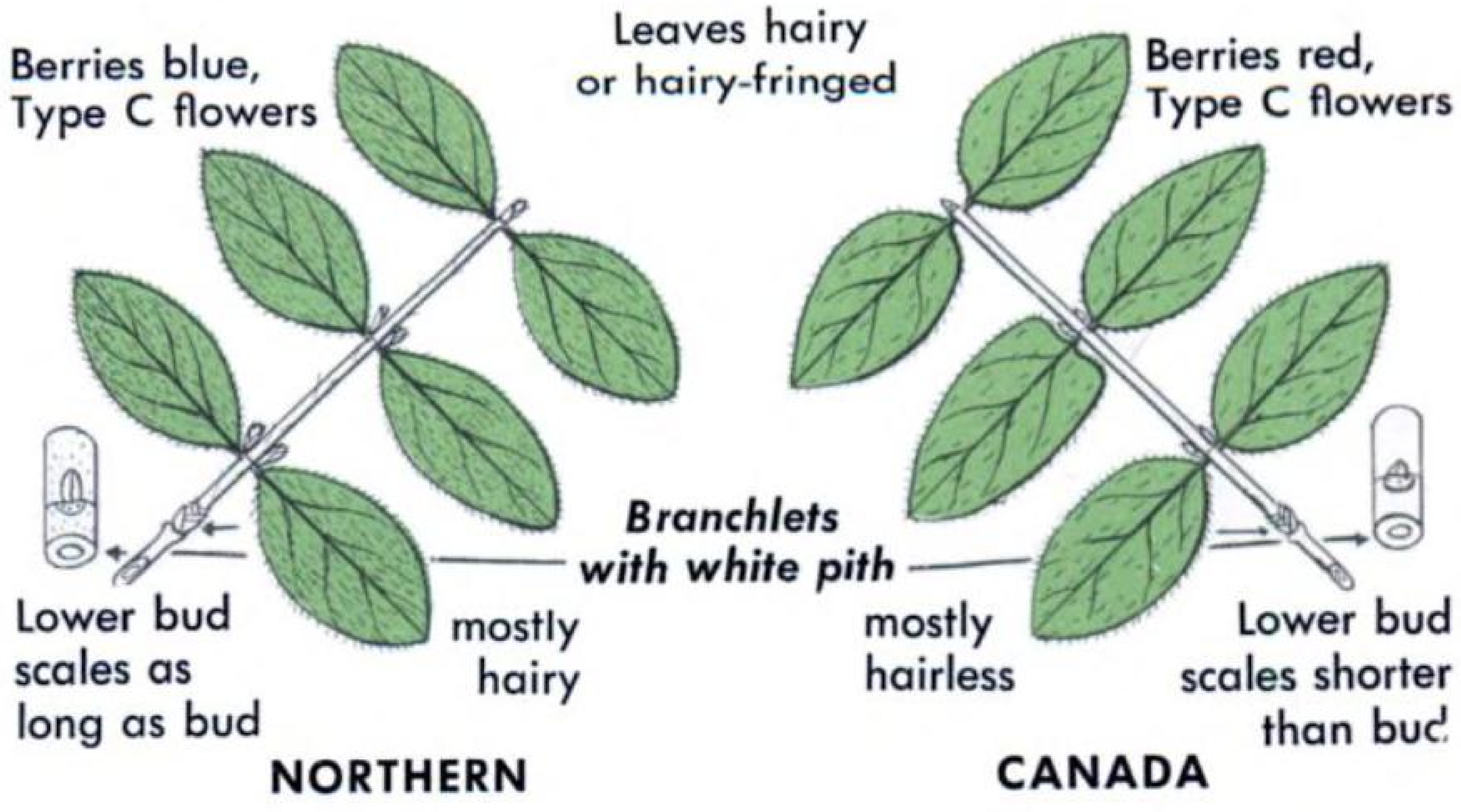
V SWAMP HONEYSUCKLE, *Lonicera oblongifolia* p. 74
Acid bogs and white cedar swamps; New Brunswick, se. Quebec, and Manitoba to e. Maine, w. Pennsylvania, Michigan, and Minnesota.

V NORTHERN HONEYSUCKLE, *Lonicera villosa* p. 74
Rocky or peaty soils, often swamps and bogs; Newfoundland, s. Labrador, and Manitoba to New England, Pennsylvania, Michigan, and Minnesota.

V CANADA HONEYSUCKLE, *Lonicera canadensis* p. 75
Woods; Nova Scotia, ne. Quebec, and Saskatchewan to n. New Jersey, Pennsylvania, w. N. Carolina, W. Virginia, Indiana, and ne. Iowa.
  V STANDISH HONEYSUCKLE, *L. standishii* (not illus.) p. 75


Berries red,
Type C flowers
Leaves
nearly
hairless
hairy
Berries red,
Type A flowers
Twigs
hairless
Twigs
hairy
Branchlets
hollow
Buds
short,
blunt
Buds
long,
sharp
TARTARIAN
EUROPEAN

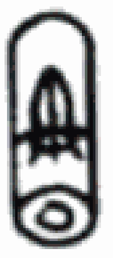

Berries black;
flowers, see
text
Leaves mostly hairless
pointed
oval
blunt-
oblong
Berries red,
Type A flowers
Branchlets
with white pith
Twigs
4-lined
Bud scales long, pointed
Twigs
unlined
FOUR-LINED
SWAMP


Berries blue,
Type C flowers
Leaves hairy
or hairy-fringed
Berries red,
Type C flowers
Branchlets
with white pith
Lower bud
scales as
long as bud
mostly
hairy
mostly
hairless
Lower bud
scales shorter
than bud
NORTHERN
CANADA

DOGWOODS

Erect shrubs or trees; leaves not toothed; leaf veins follow the smooth leaf edges toward the tips; twigs often reddish or purple; leaf buds with only 1 pair of scales.

Typical bud shown at right.



Ѵ ROUNDLEAF DOGWOOD, *Cornus rugosa* p. 75
Woods and thickets; Nova Scotia, e. Quebec, and Manitoba to New England, w. Virginia, W. Virginia, Indiana, and ne. Iowa.

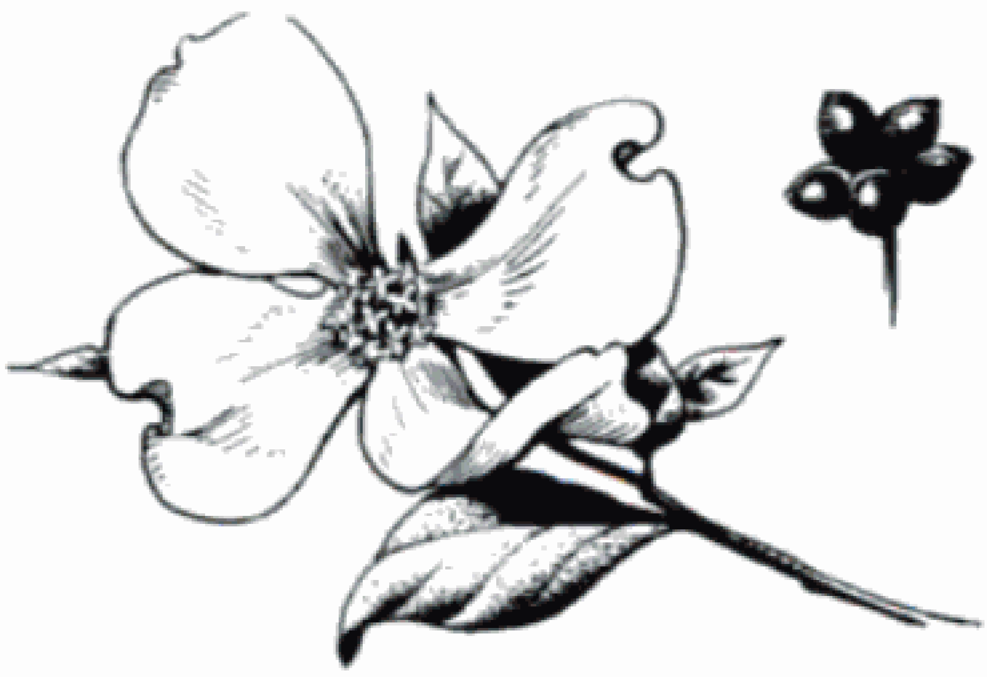
↟ FLOWERING DOGWOOD, *Cornus florida* p. 76
Woodlands; sw. Maine, s. Vermont, s. Ontario, s. Michigan, and e. Kansas to Florida and e. Texas.

Ѵ RED-PANICLE DOGWOOD, *Cornus racemosa* p. 76
Hedgerows and thickets; centr. Maine, s. Ontario, and Minnesota to Delaware, W. Virginia, Kentucky, and Oklahoma.

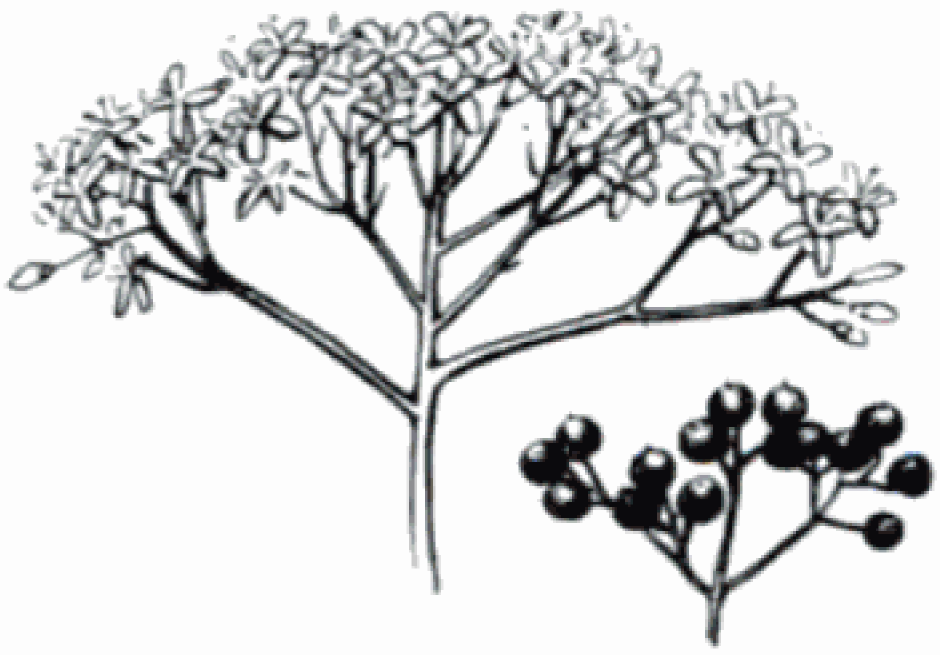
Ѵ RED-OSIER DOGWOOD, *Cornus stolonifera* p. 76
Wet places; Newfoundland, s. Labrador, and Alaska to New York, w. Maryland, W. Virginia, Indiana, Nebraska, New Mexico, and California.
  Ѵ STIFF DOGWOOD, *C. foemina* (not illus.) p. 77

Ѵ SILKY DOGWOOD, *Cornus amomum* p. 77
Wet places; s. Maine and Indiana to s. New England, Georgia, and Alabama.
  Ѵ NARROWLEAF DOGWOOD, *C. obliqua* (not illus.) p. 77

↟Ѵ ROUGHLEAF DOGWOOD, *Cornus drummondi* p. 77
Wet places; s. Ontario, Illinois, and Nebraska to Mississippi and e. Texas.
  ↟Ѵ PRICE DOGWOOD, *C. priceae* (not illus.) p. 78



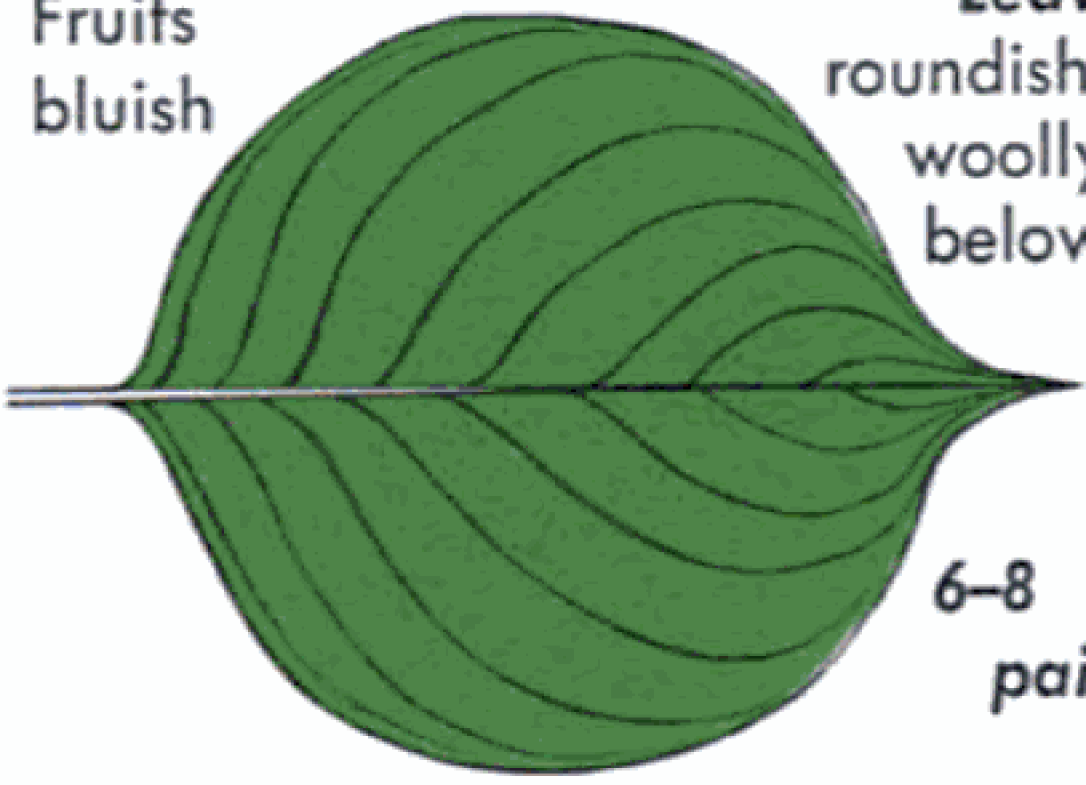
FLOWERING DOGWOOD



OTHER DOGWOODS

Leaves broad

Fruits bluish

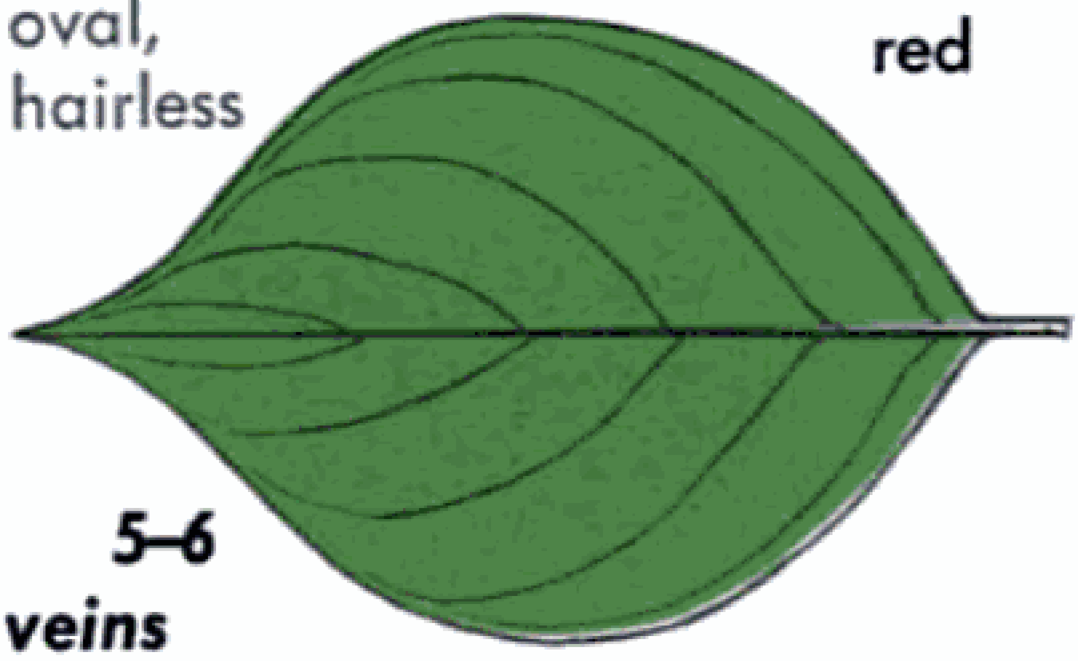


roundish, woolly below

6–8

oval, hairless

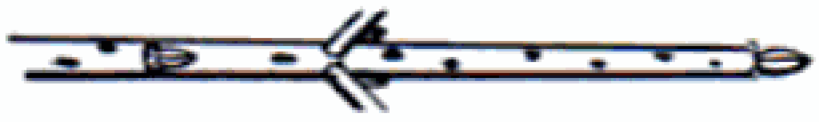
Fruits red



5–6

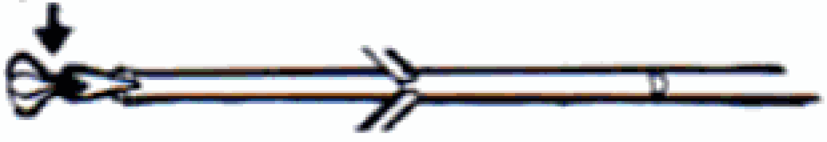
pairs of veins

Twigs, branchlets green or reddish, blotched purple



ROUNDLEAF

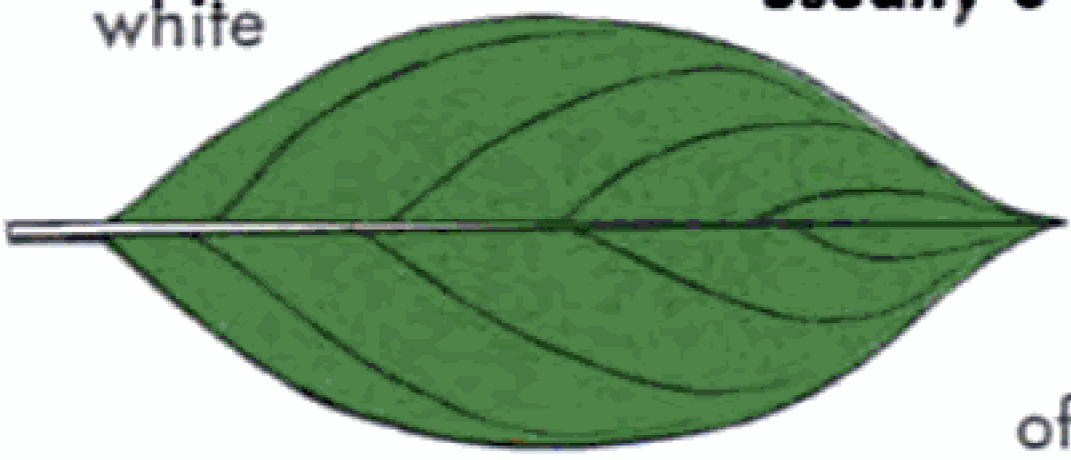
Twigs, etc., green to dark purple; flower buds stalked



FLOWERING

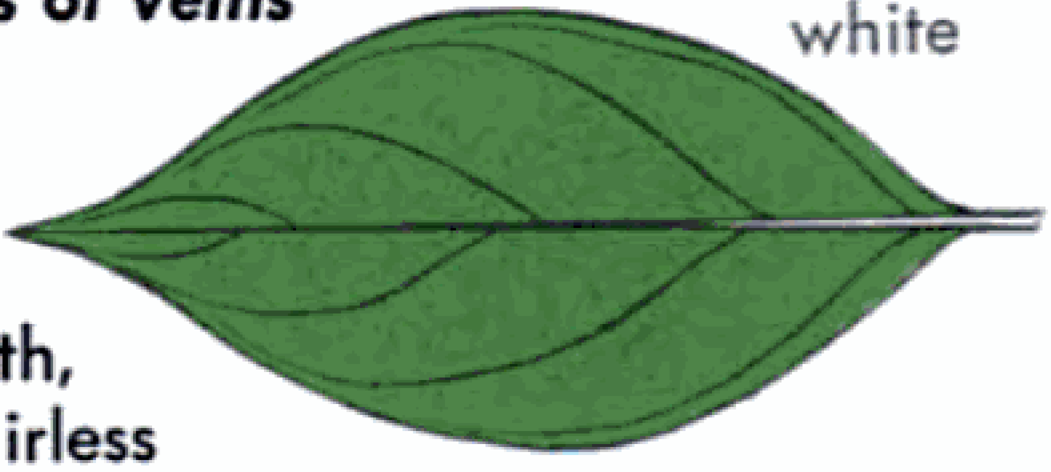
Leaves rather narrow; usually 3–5 pairs of veins

Fruits white

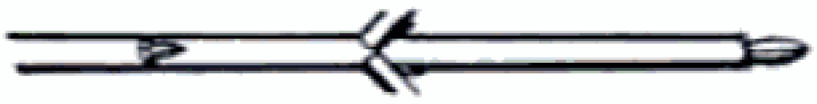


smooth, often hairless

Fruits white

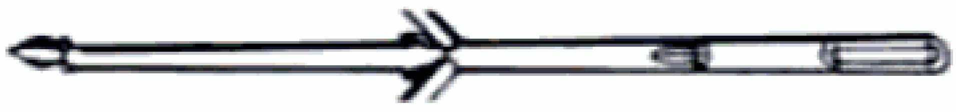


Twigs brown, branchlets gray, hairless; pith brownish



RED-PANICLE

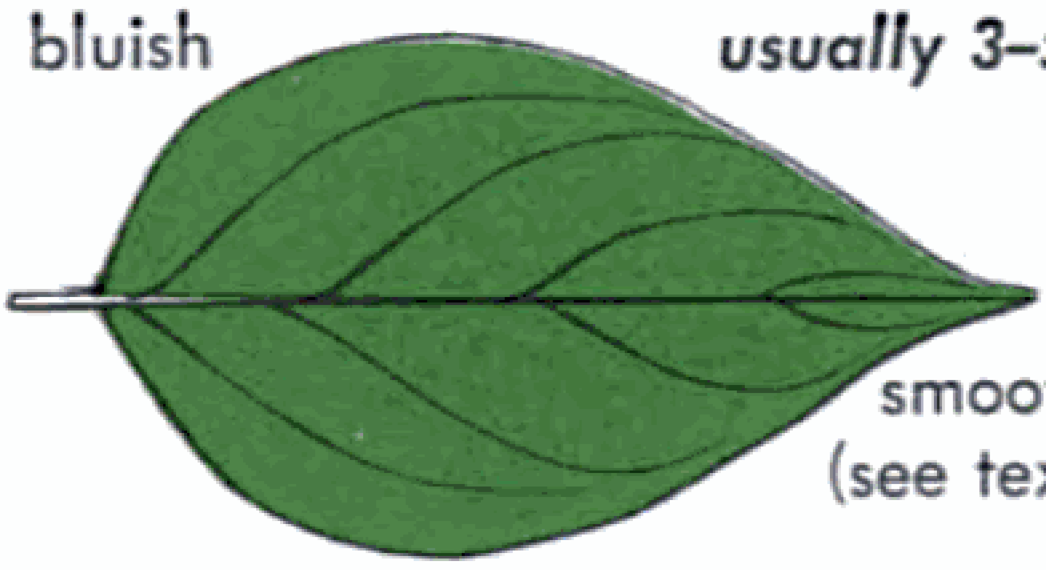
Twigs, branchlets bright red, typically hairless; pith white



RED-OSIER

Leaves rather narrow; usually 3–5 pairs of veins

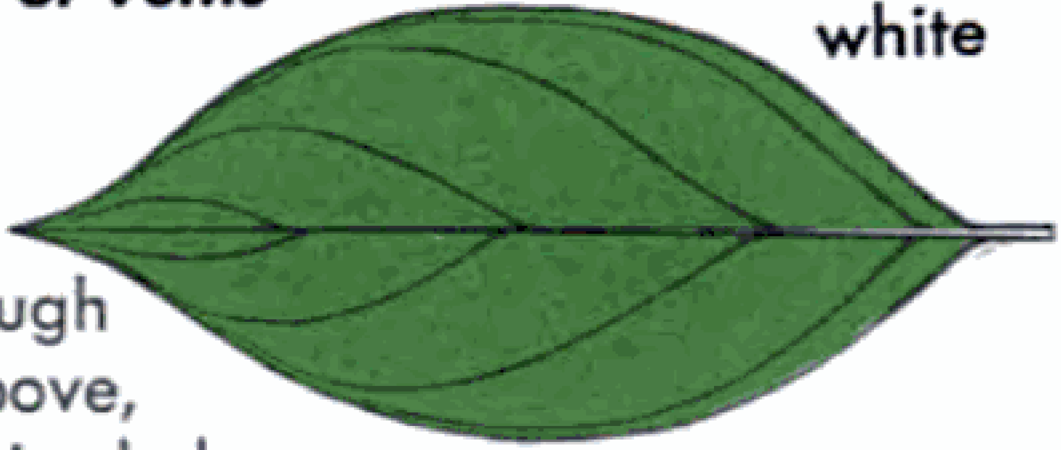
Fruits bluish



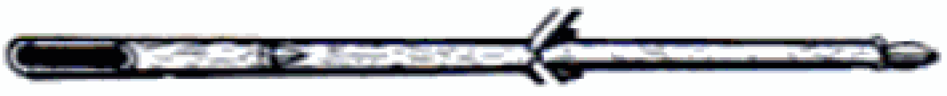
smooth (see text)

rough above, hairy below

Fruits white

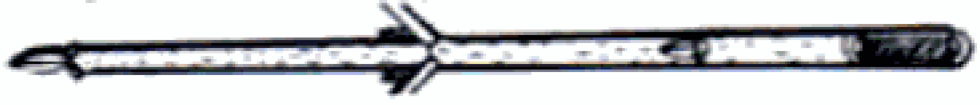


Twigs and branchlets dull purple, silky; pith brown



SILKY

Twigs reddish, branchlets brown or gray, rough-hairy; pith usually brown



ROUGHLEAF

PLANTS WITH OPPOSITE LEAVES NOT TOOTHED (1)

Erect woody plants with leaves paired or whorled.

ψ SHEEP LAUREL, *Kalmia angustifolia* p. 78
Moist open areas, often bogs; Newfoundland, Labrador, and Manitoba to S. Carolina, nw. Georgia, and Tennessee.

ψ PALE LAUREL, *Kalmia polifolia* p. 79
Bogs and peat soils; Newfoundland, Labrador, and Alaska to New Jersey, Pennsylvania, Michigan, and Oregon.

ψ COMMON PRIVET, *Ligustrum vulgare* p. 79
Thickets, field borders and open woods; s. Maine and s. Ontario to N. Carolina, Ohio, and Michigan.

ψ CALIFORNIA PRIVET, *L. ovalifolium* (not illus.) p. 79
ψ AMUR PRIVET, *L. amurense* (not illus.) p. 79
ψ REGAL PRIVET, *L. obtusifolium* (not illus.) p. 80

ψ BUTTONBUSH, *Cephalanthus occidentalis* p. 80
Shallow ponds and wet shores; w. Nova Scotia, sw. Quebec, s. Ontario, s. Michigan, and se. Minnesota to Florida, Texas, and California.

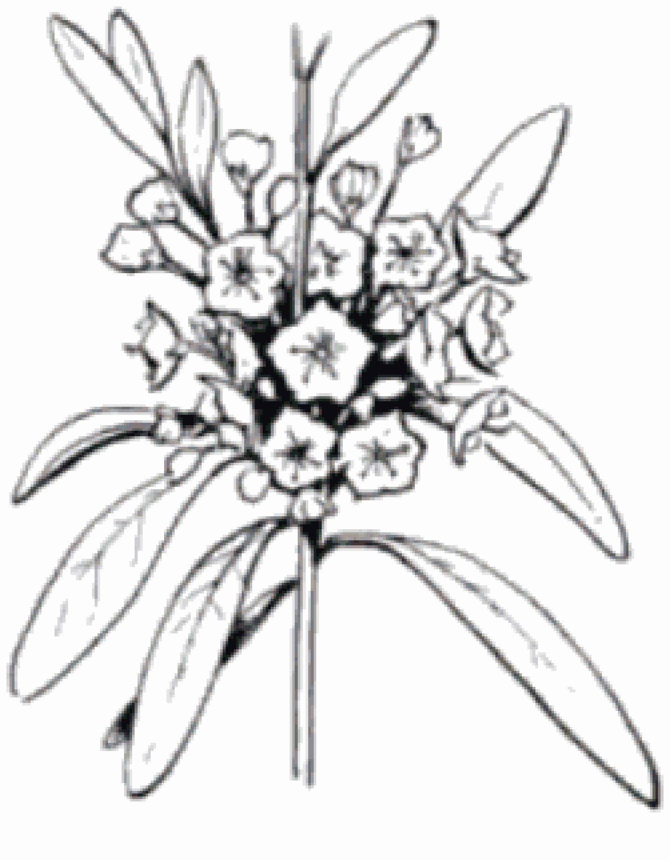
ψ SEA-OXEYE, *Borrichia frutescens* (not illus.) p. 81

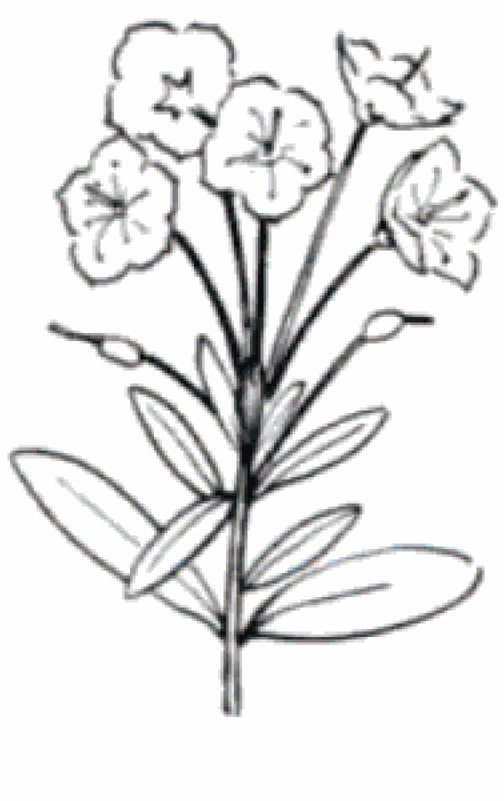
ψ SMOOTH ALLSPICE, *Calycanthus fertilis* p. 81
Mountain forests; s. Pennsylvania and s. Ohio to Georgia and Alabama.

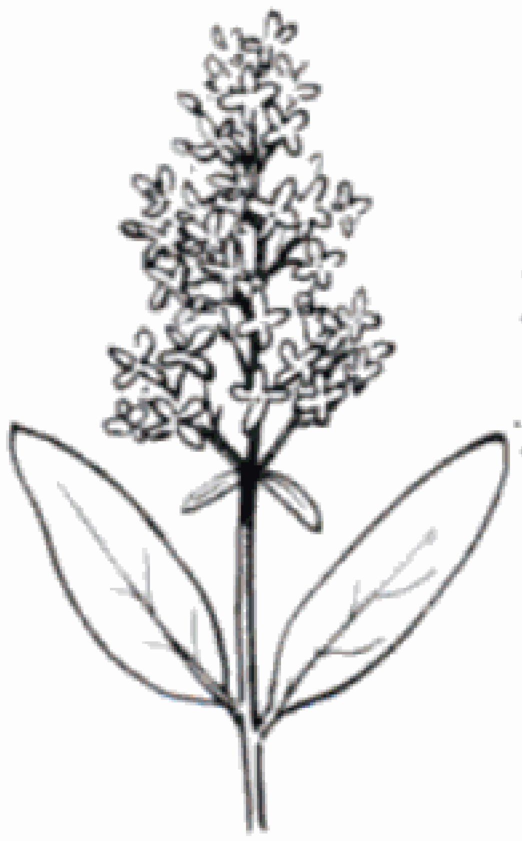
ψ HAIRY ALLSPICE, *C. floridus* (not illus.) p. 81

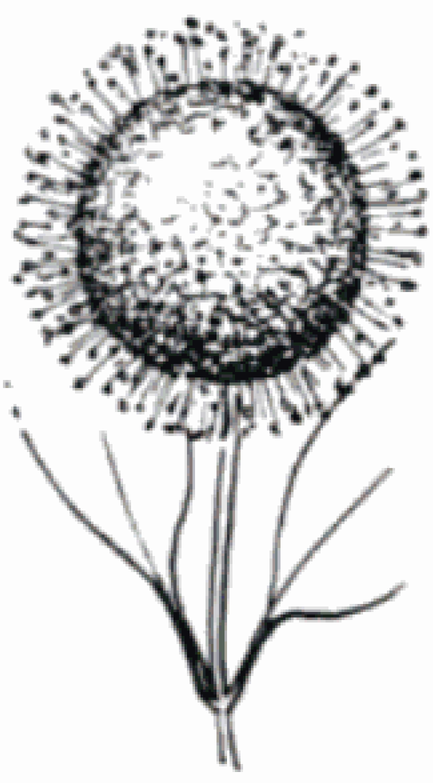
↑ψ FRINGE-TREE, *Chionanthus virginicus* p. 81
Floodplains; New Jersey, W. Virginia, s. Ohio, s. Missouri, and se. Oklahoma to centr. Florida, e. Texas.

For the following species not illustrated, see text:
↑ DEVILWOOD, *Osmanthus americanus* p. 79
ψ BUCKLEYA, *Buckleya distichophylla* p. 80
ψ NESTRONIA, *Nestronia umbellula* p. 80
ψ SWAMP LOOSESTRIFE, *Decodon verticillatus* p. 80


SHEEP LAUREL


PALE LAUREL


PRIVET

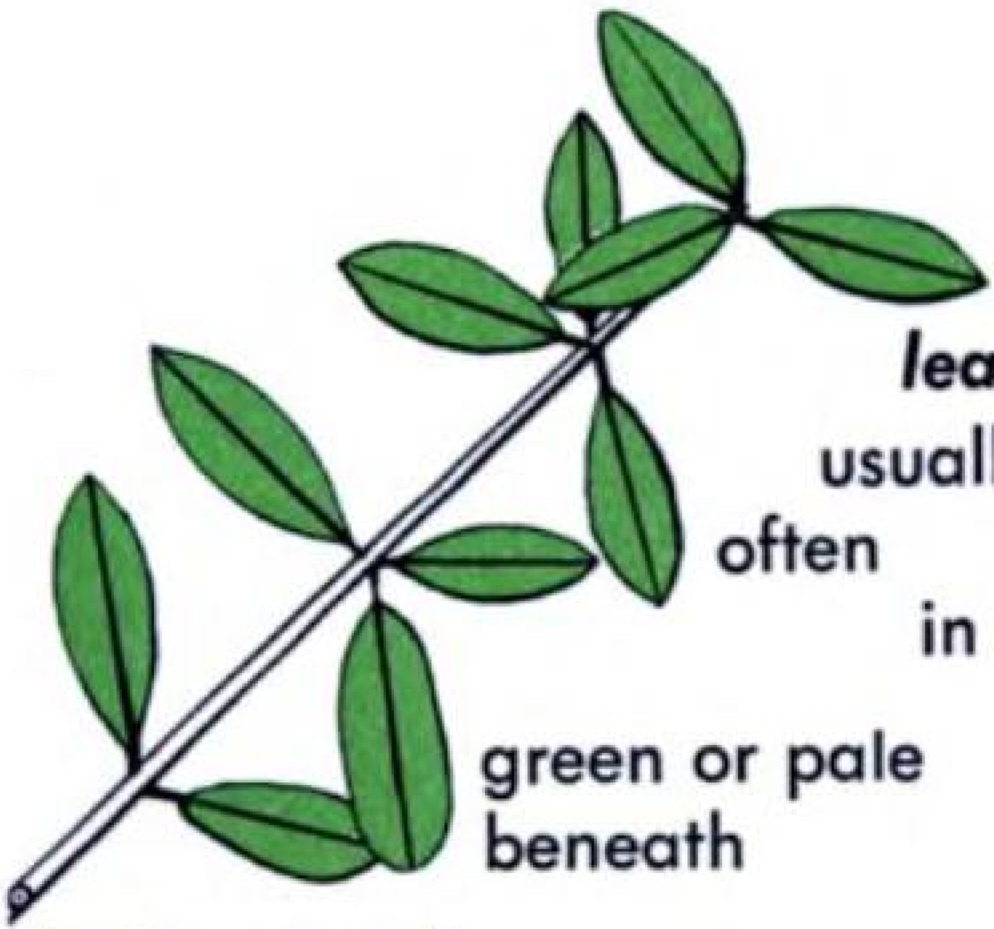

BUTTONBUSH

Leaves leathery, evergreen

usually less than 2" long

often / seldom

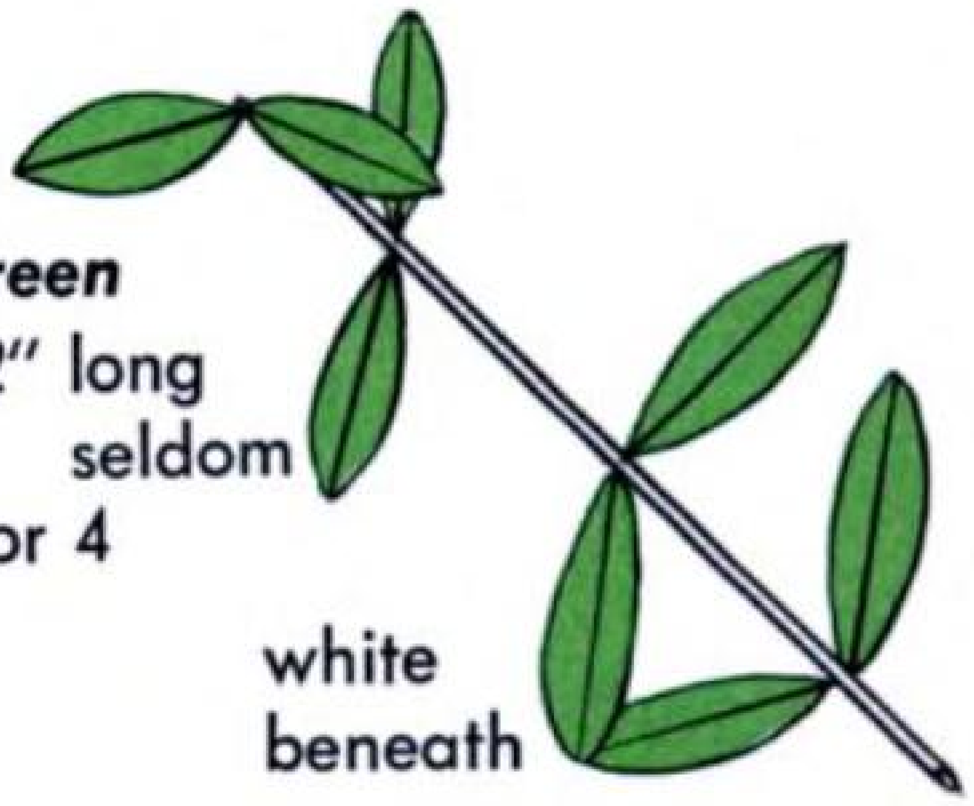
in whorls of 3 or 4



green or pale beneath

Twigs round, hairless

SHEEP LAUREL



white beneath

Twigs 2-edged, hairless

PALE LAUREL

Leaves neither leathery nor evergreen

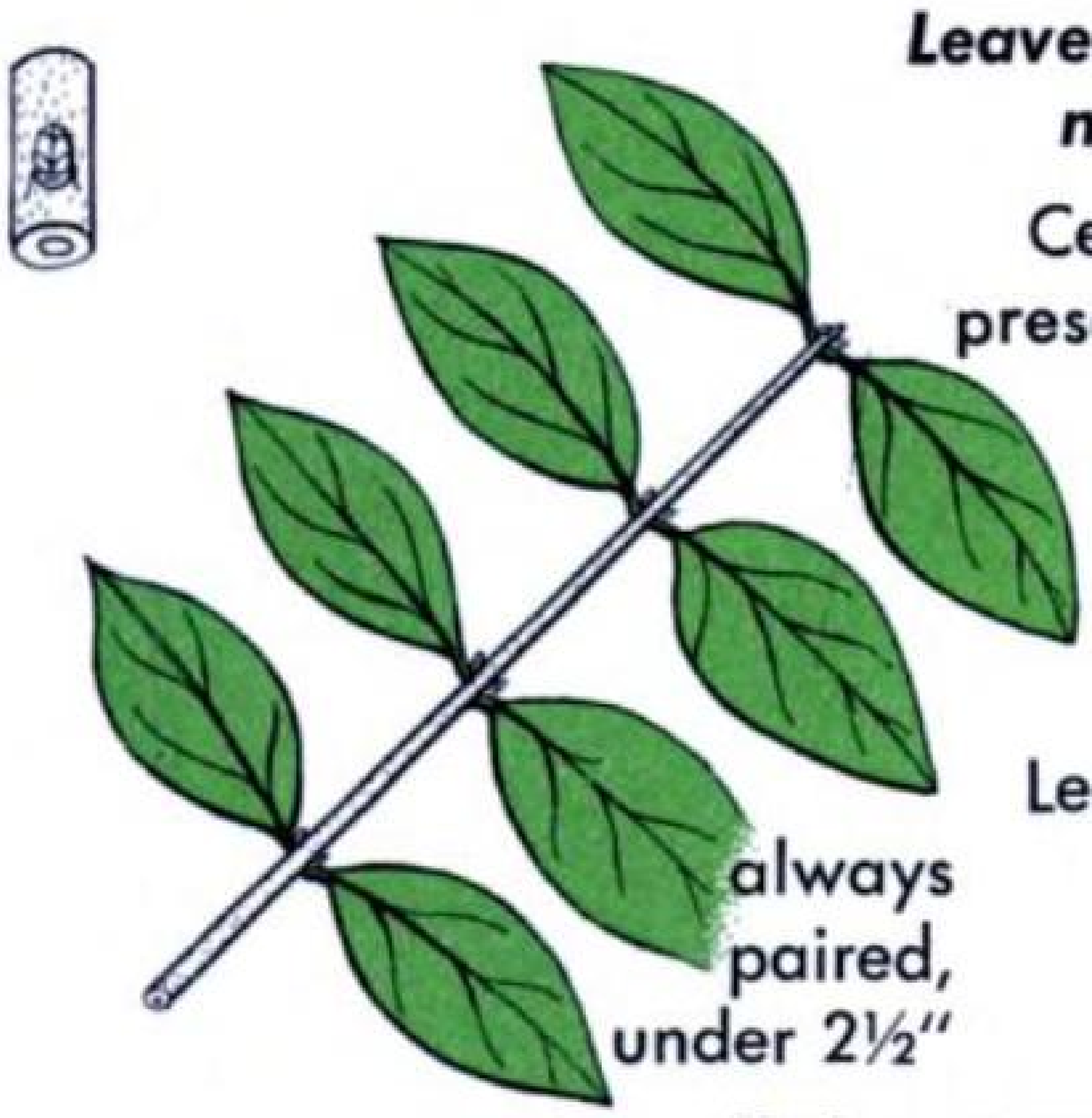
Central end bud

present / lacking

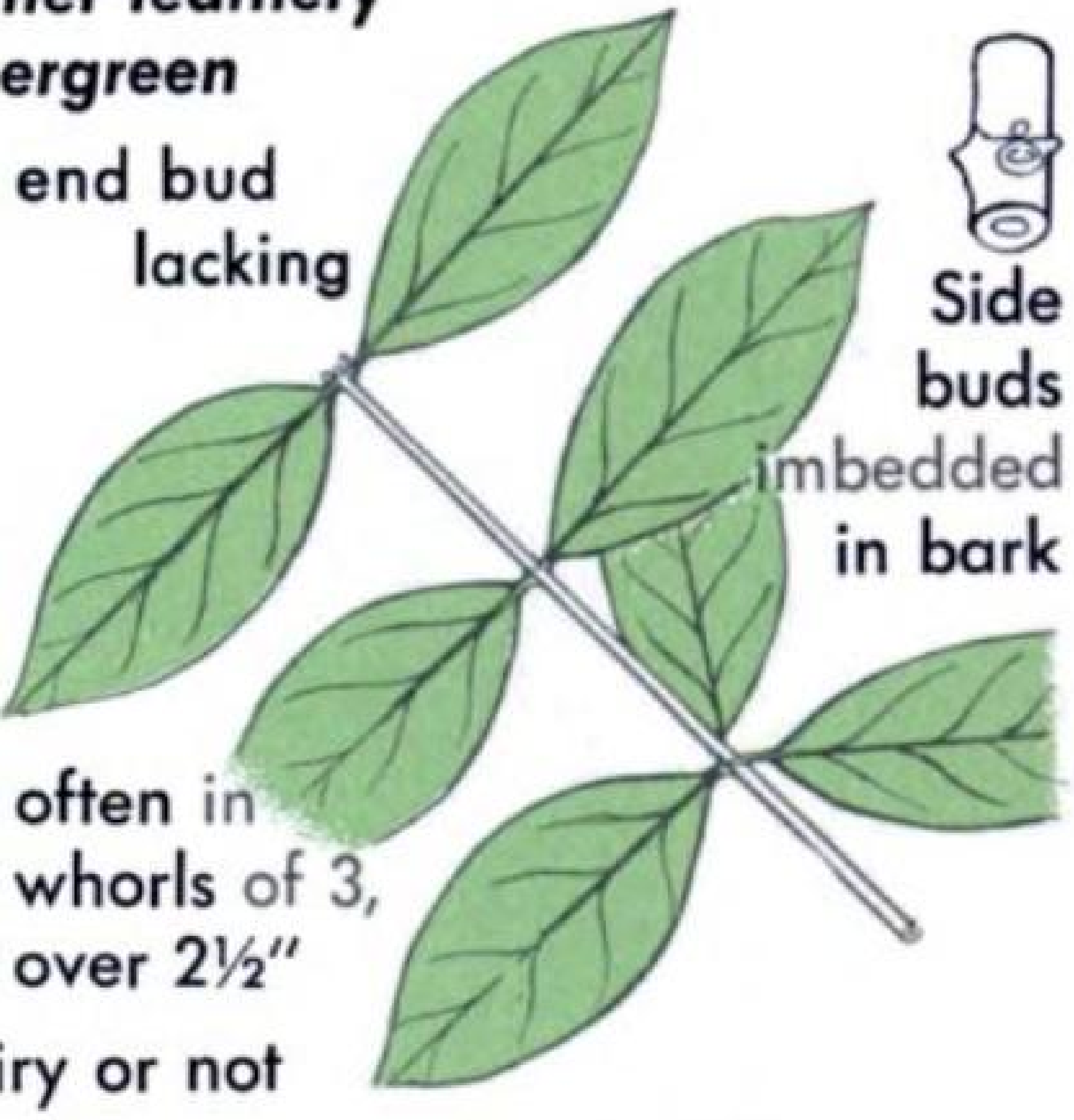
Leaves

always paired, under 2½" / often in whorls of 3, over 2½"

Twigs round, hairy or not



COMMON PRIVET



Side buds imbedded in bark

BUTTONBUSH

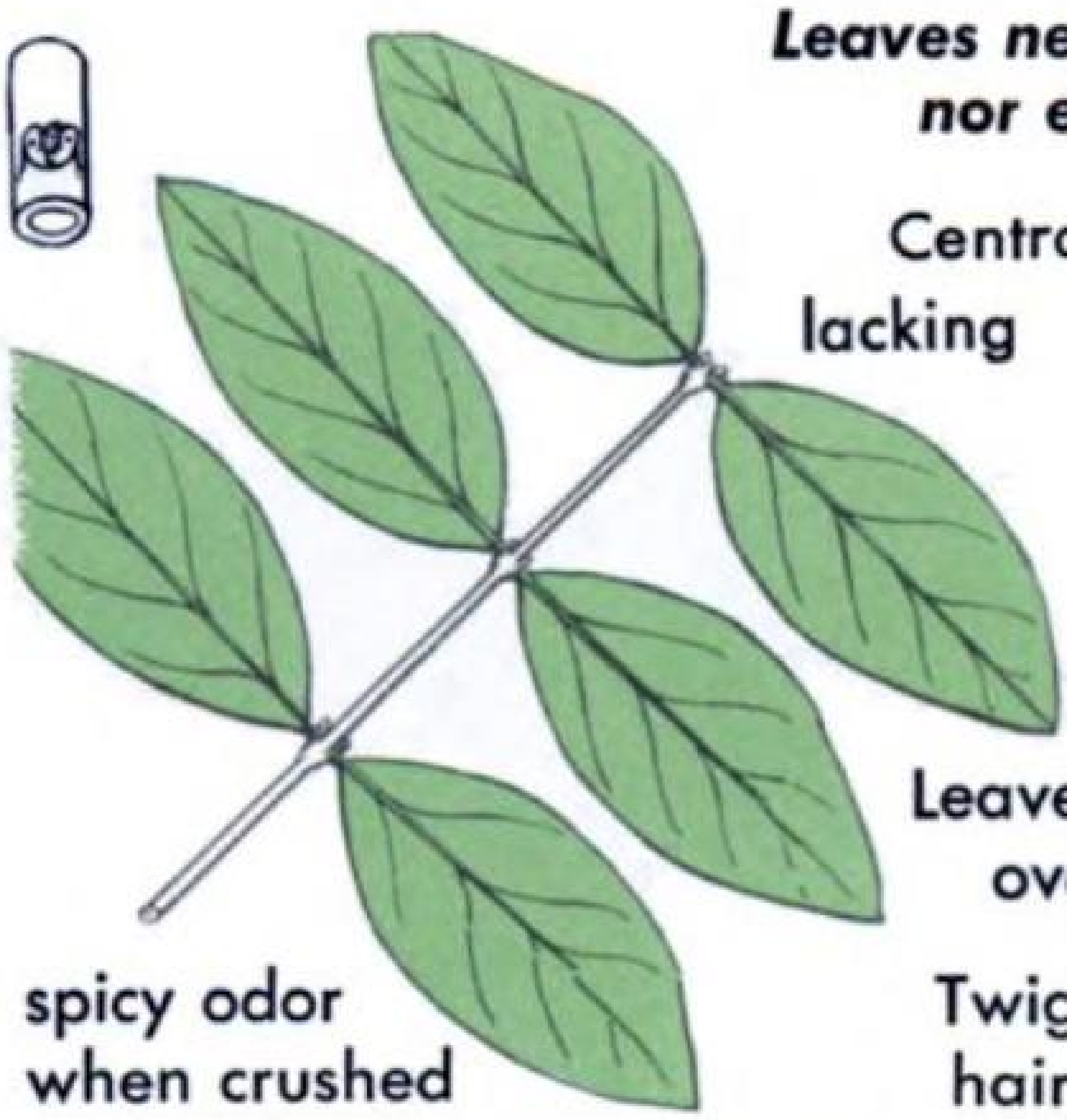
Leaves neither leathery nor evergreen

Central end bud

lacking / present

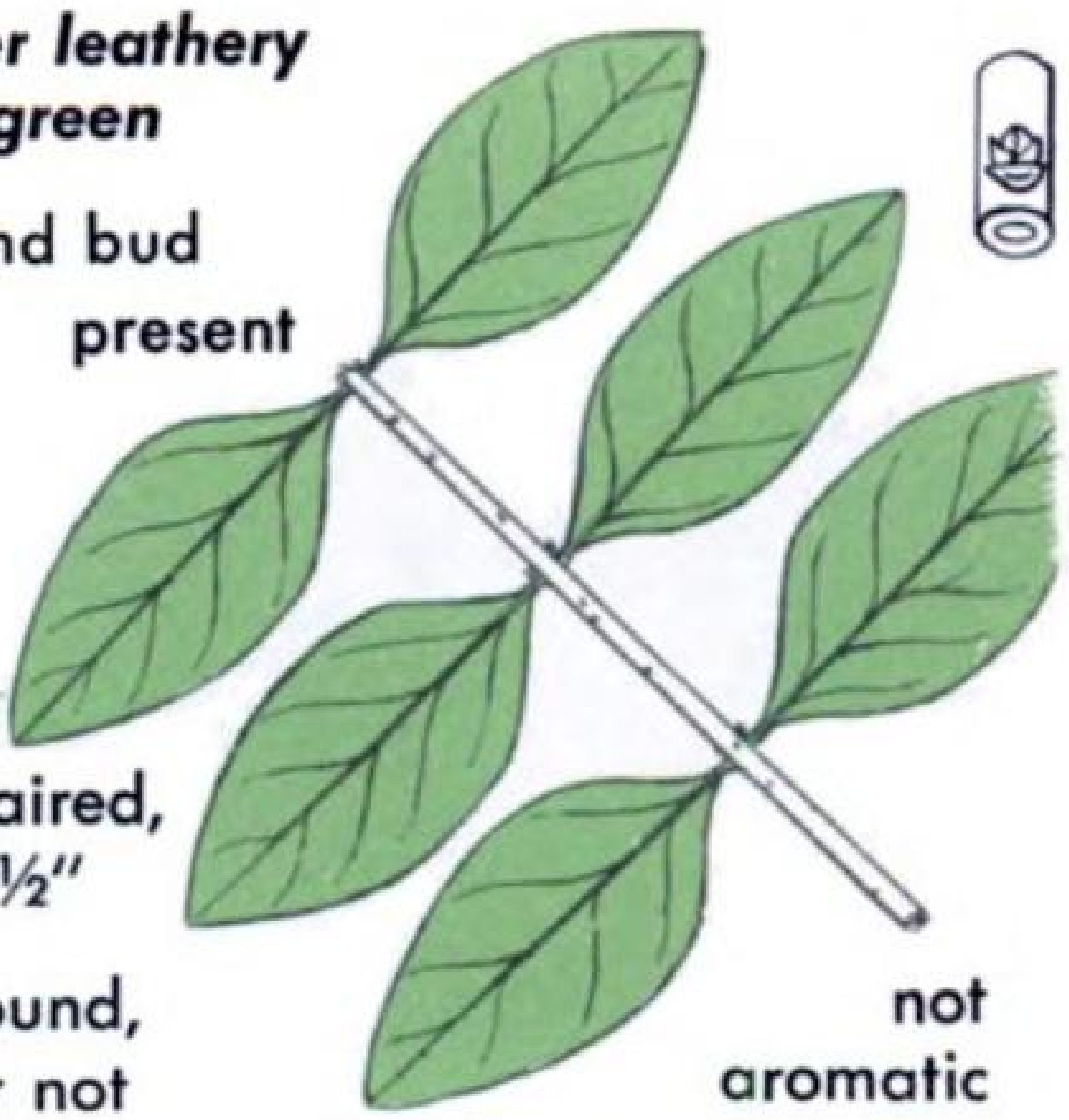
Leaves paired, over 2½"

Twigs round, hairy or not



spicy odor when crushed

SMOOTH ALLSPICE



not aromatic

FRINGE-TREE

PLANTS WITH OPPOSITE LEAVES NOT TOOTHED (2)

Erect woody plants with leaves always paired.

V CORALBERRY, *Symphoricarpos orbiculatus* p. 82
Old fields and open woods; New England, Ohio, Illinois, Minnesota, S. Dakota, and Colorado to Florida and Texas.

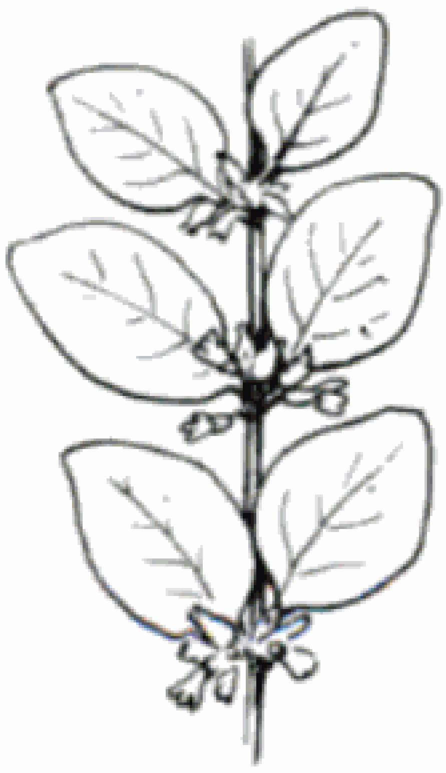
V SNOWBERRY, *Symphoricarpos albus* p. 82
Dry and rocky soils; e. Quebec and British Columbia to Massachusetts, w. Virginia, W. Virginia, Michigan, Wisconsin, Nebraska, and Colorado.
V WOLFBERRY, S. *occidentalis* (not illus.) p. 82

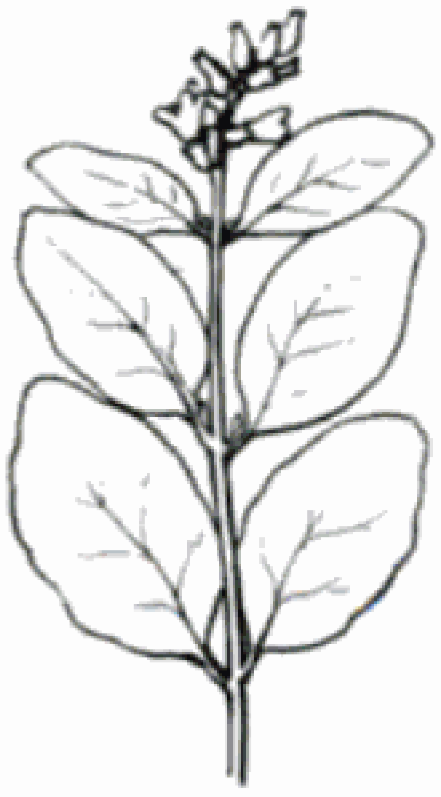
V KALM ST. JOHNSWORT, *Hypericum kalmianum* p. 82
Dry or sandy soils; mostly near Great Lakes, w. New York, w. Quebec, and w. Ontario to Ohio and Illinois.

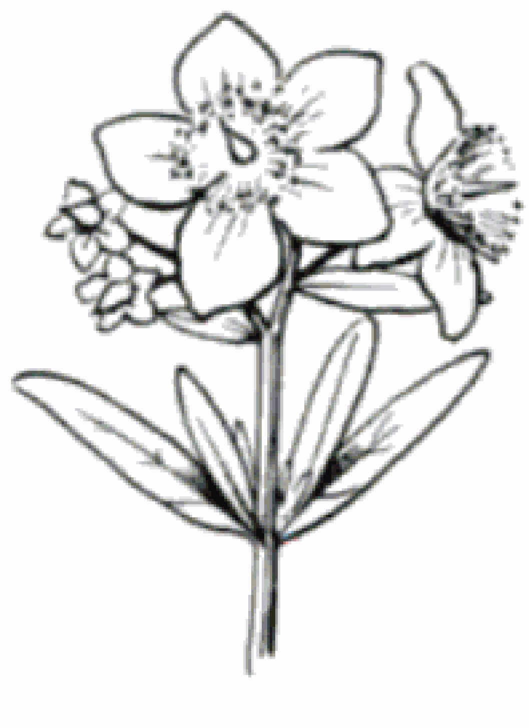
V SHRUBBY ST. JOHNSWORT, *Hypericum spathulatum* p. 83
Open areas; Massachusetts, Ontario, and Minnesota to Georgia, Alabama, and Arkansas.
V GOLDEN ST. JOHNSWORT p. 83
H. frondosum (not illus.)
V DENSE ST. JOHNSWORT p. 83
H. densiflorum (leaf illus.)

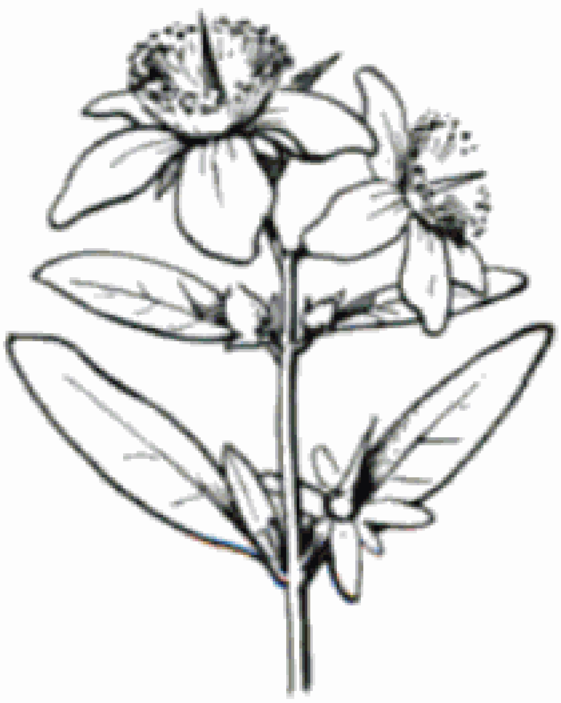
V CANADA BUFFALOBERRY, *Shepherdia canadensis* p. 83
Rocky and sandy soils; Newfoundland and Alaska to Maine, n. Ohio, n. Illinois, S. Dakota, and New Mexico.
V SILVER BUFFALOBERRY, S. *argentea* (not illus.) p. 84

V SANDMYRTLE, *Leiophyllum buxifolium* p. 84
Sandy pinelands in separated areas; New Jersey, the Carolinas, and in e. Kentucky.


CORALBERRY

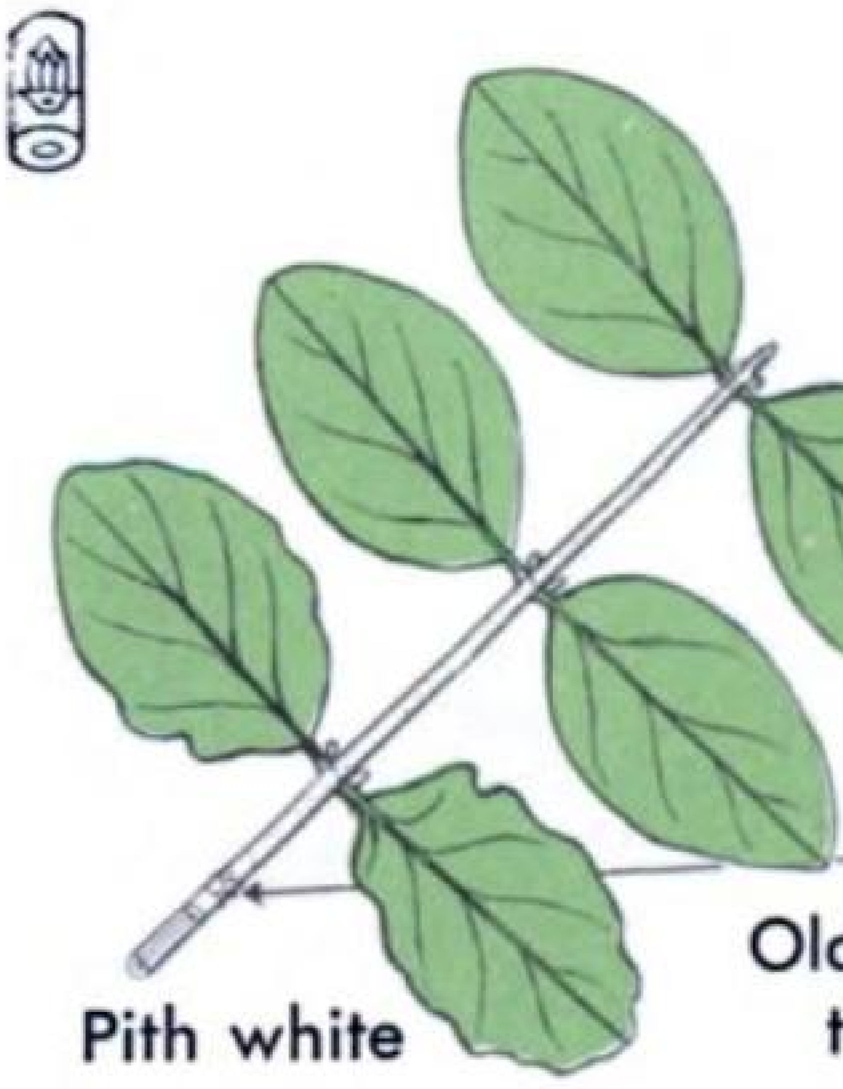

SNOWBERRY


KALM ST. JOHNSWORT


SHRUBBY ST. JOHNSWORT

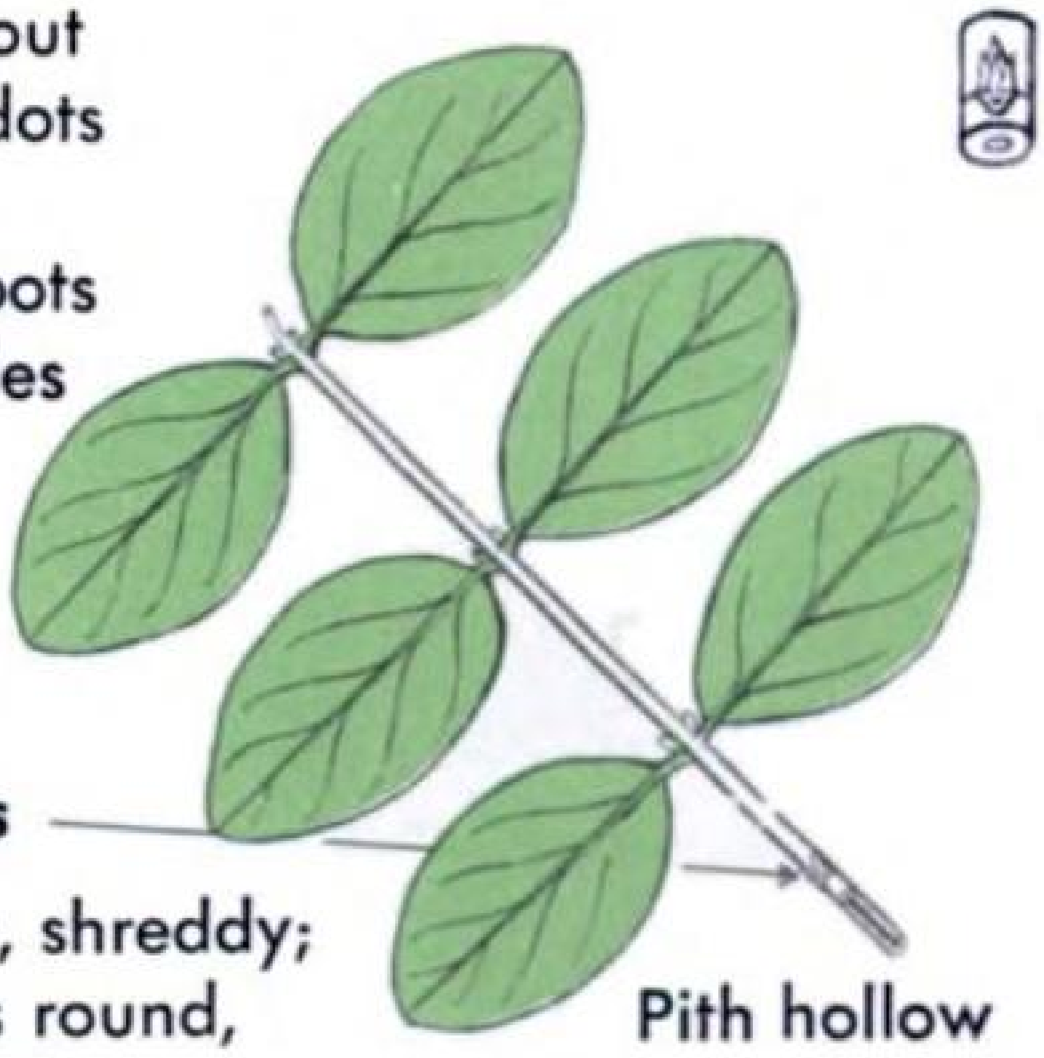
Leaves without transparent dots

No leafy shoots in leaf-angles



Pith white

CORALBERRY



Pith hollow

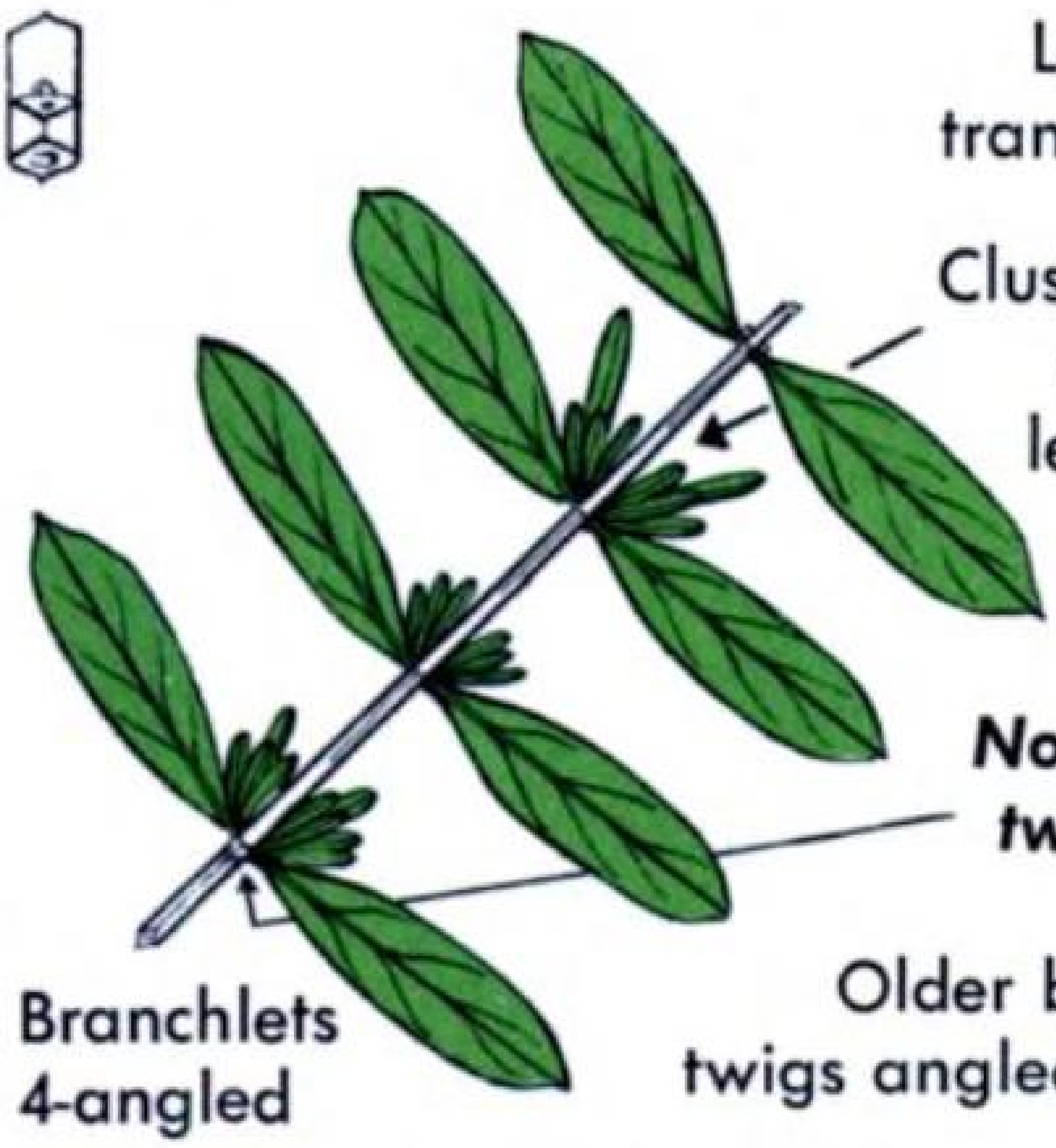
SNOWBERRY

Scales at twig bases

Older bark papery, shreddy; twigs, branchlets round, somewhat hairy

Leaves with transparent dots

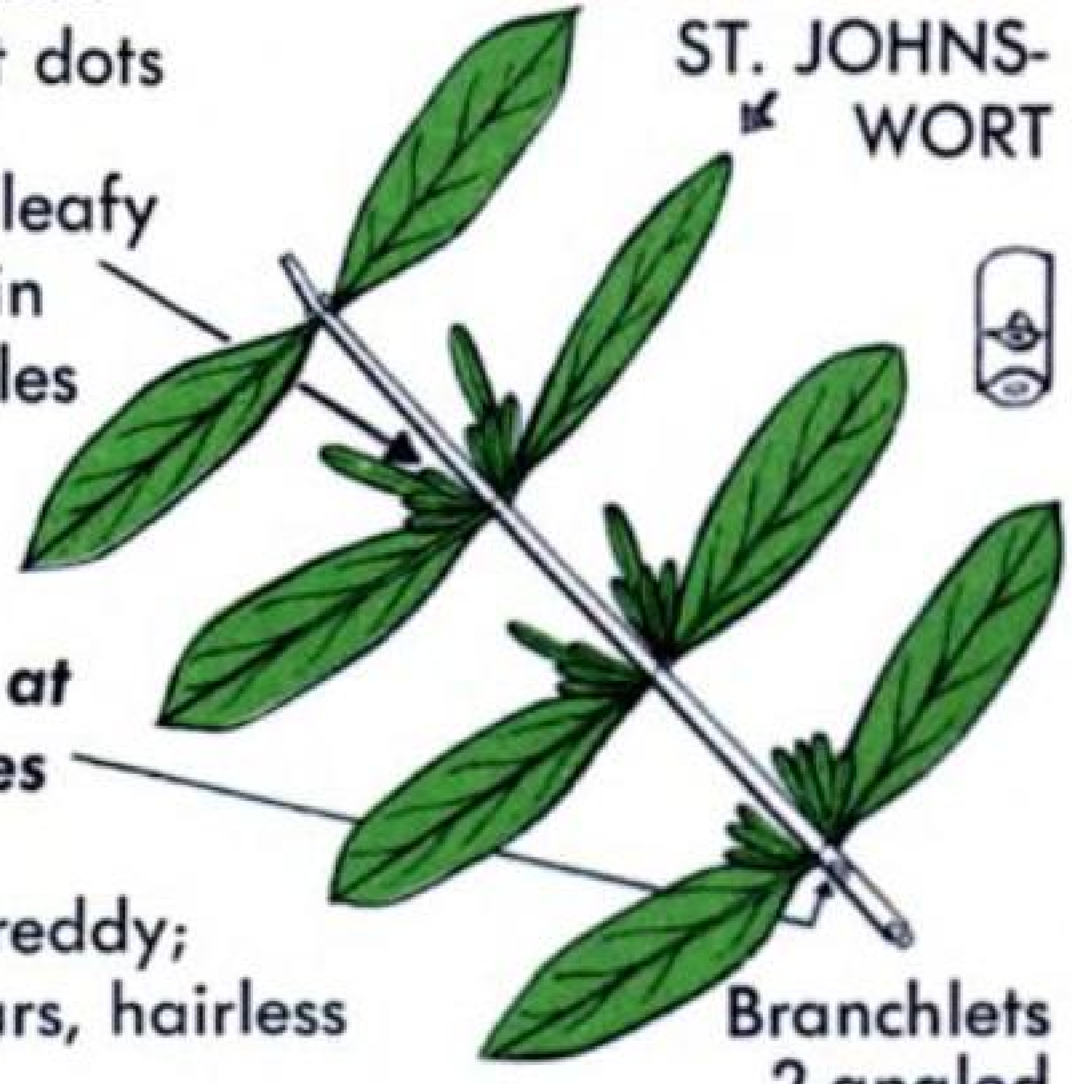
Clusters of leafy shoots in leaf-angles



Branchlets 4-angled

KALM ST. JOHNSWORT

Leaf of DENSE ST. JOHNSWORT



Branchlets 2-angled

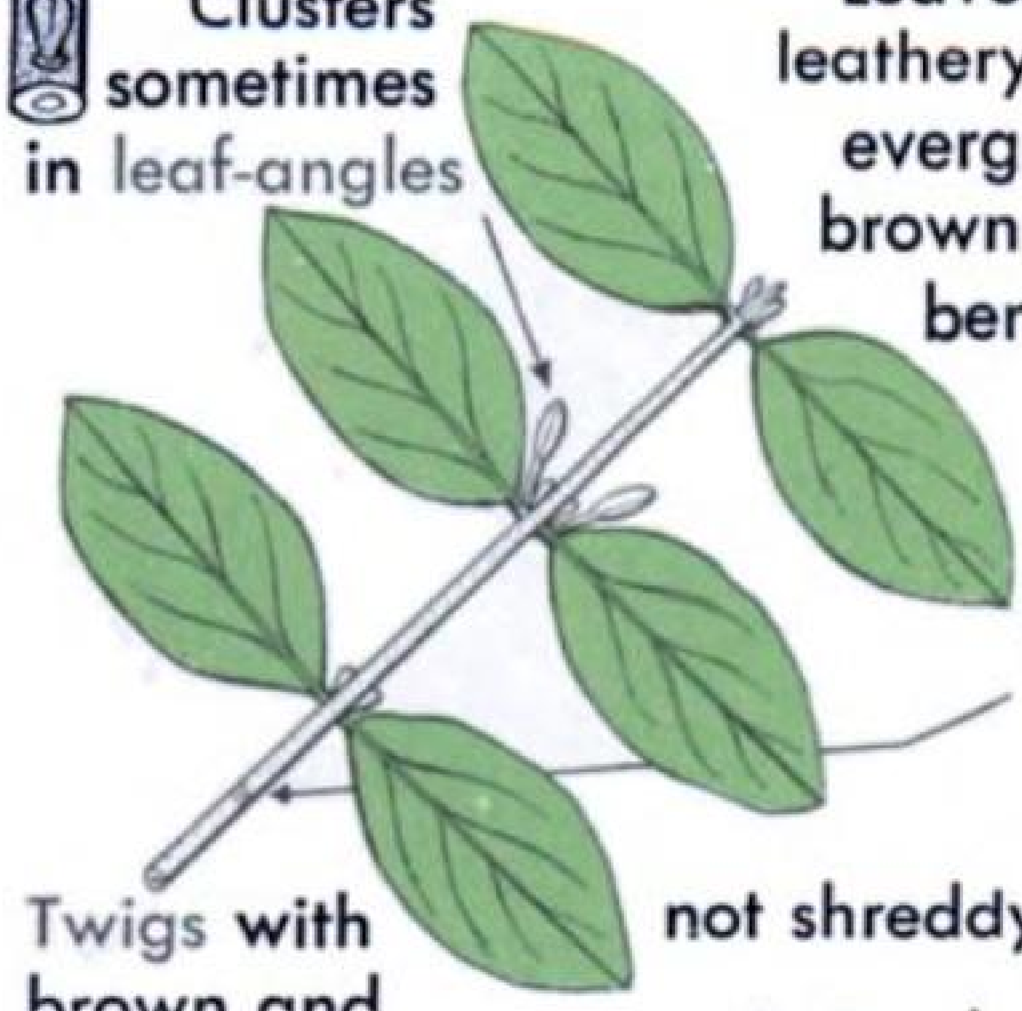
SHRUBBY ST. JOHNSWORT

No scales at twig bases

Older bark shreddy; twigs angled at scars, hairless

Clusters sometimes in leaf-angles

Leaves not leathery, not evergreen; brown dots beneath

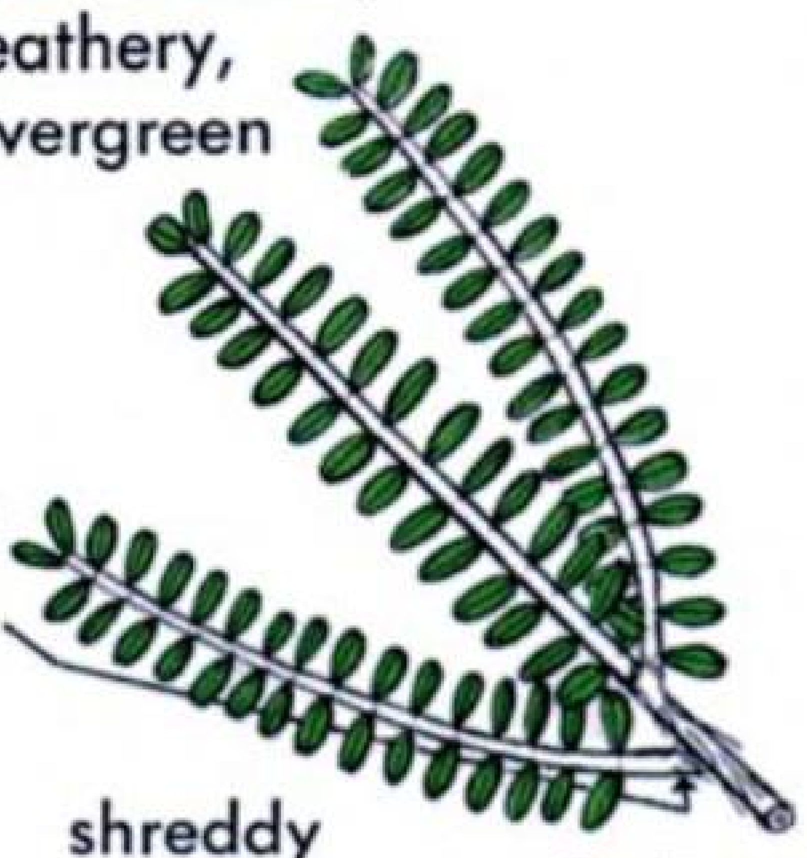


Twigs with brown and silver scales

Older bark not shreddy

CANADA BUFFALOBERRY

Leaves small, leathery, evergreen



Older bark shreddy

Twigs not scaly

SANDMYRTLE

No scales at twig bases

Twigs, branchlets round, hairless

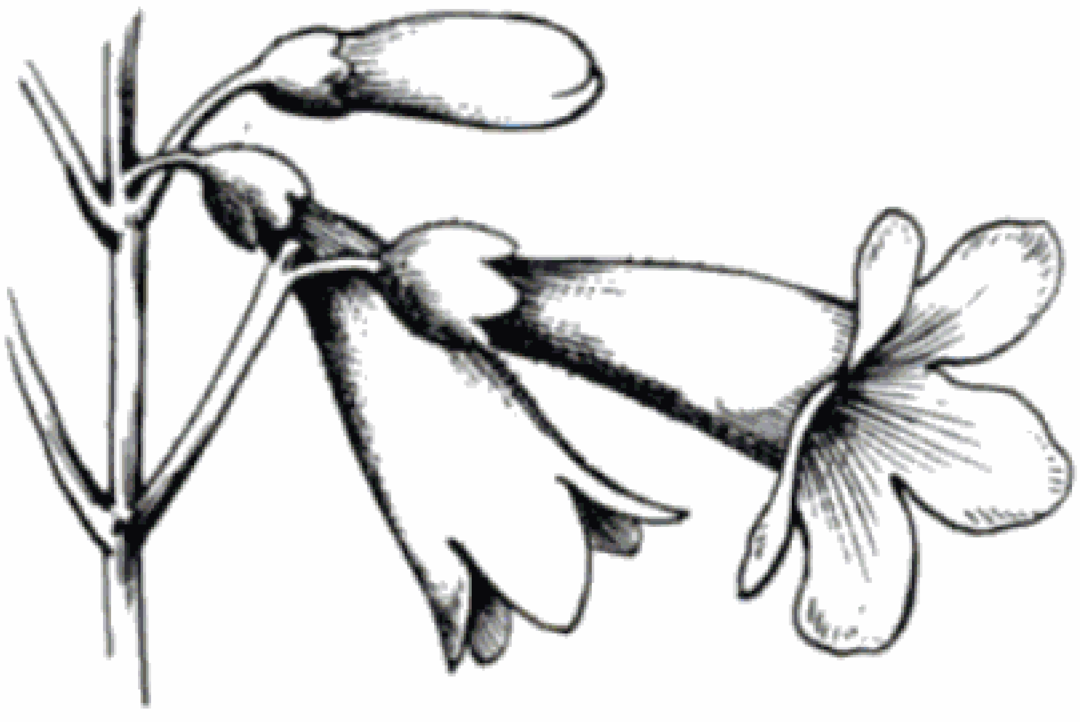
PLANTS WITH OPPOSITE HEART-SHAPED LEAVES

The Princess-tree and the catalpas are the only large trees with opposite or whorled simple leaves. The lilacs are the only shrubs with opposite leaves that are mostly heart-shaped and not toothed. Central end buds are lacking.

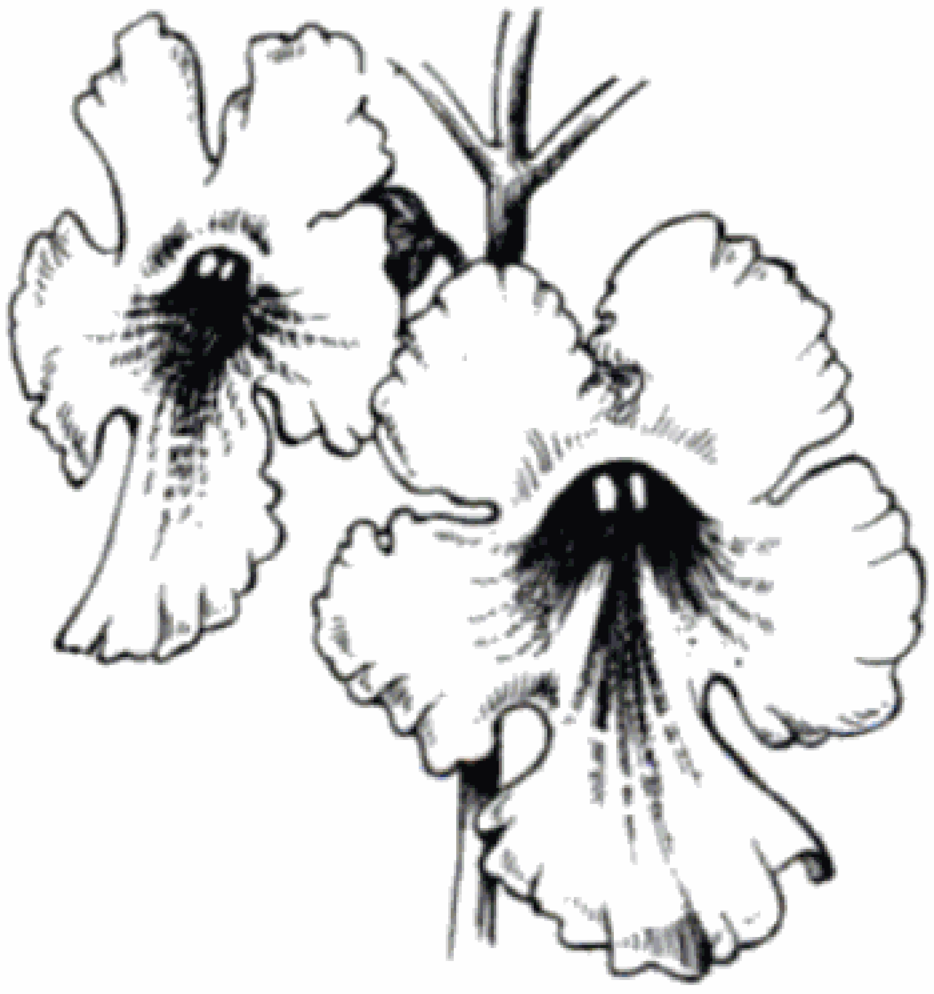
Ψ COMMON LILAC, *Syringa vulgaris* p. 84
Escaped from cultivation.
  Ψ PERSIAN LILAC, *S. persica* (not illus.) p. 85

⍋ PRINCESS-TREE, *Paulownia tomentosa* p. 85
Oriental; waste places; s. New York, W. Virginia, and e. Missouri to n. Florida and s. Texas.

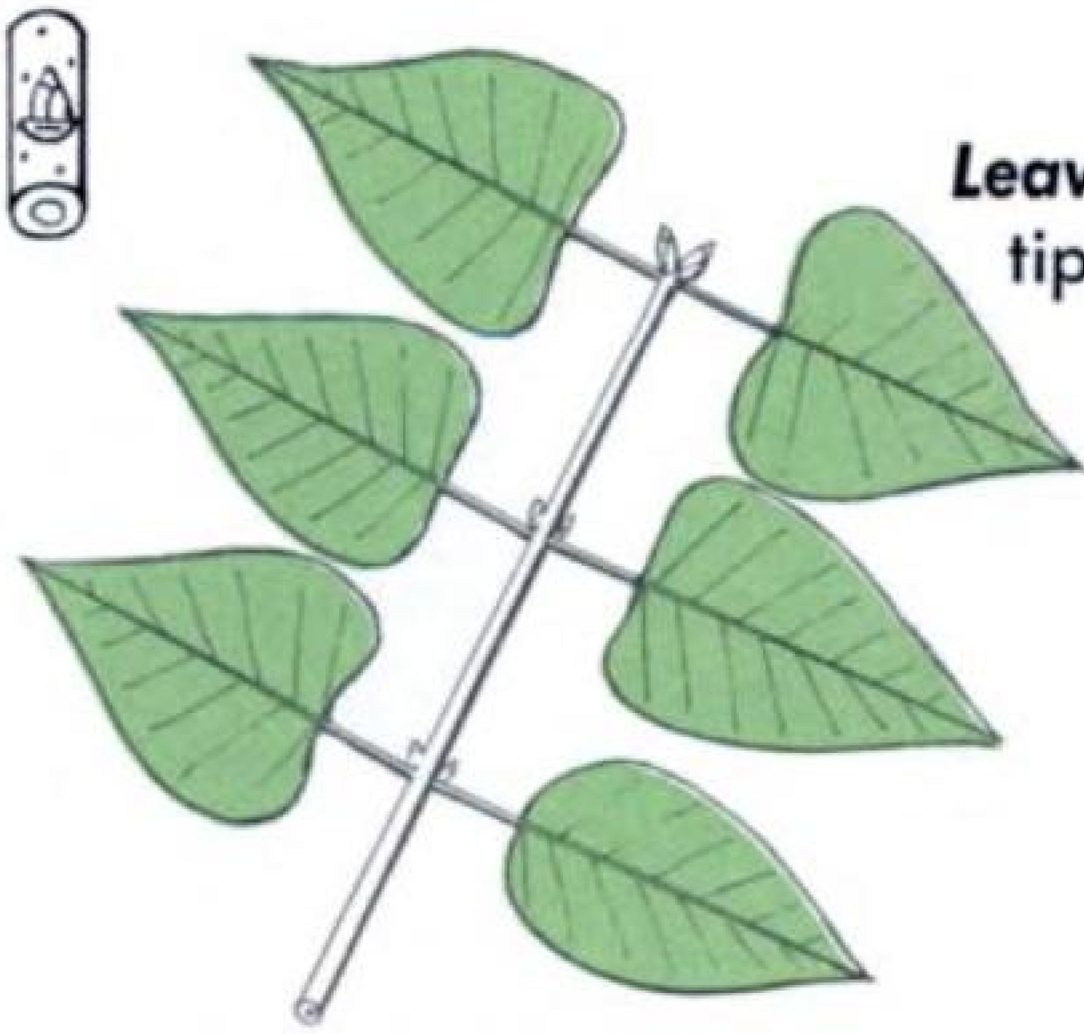
⍋ COMMON CATALPA, *Catalpa bignonioides* p. 85
Gulf Coast; but escaped from cultivation from s. New England, Ohio, and Michigan to Florida and Texas.
  ⍋ CATAWBA-TREE, *C. speciosa* (not illus.) p. 85
Wet woods; e. Virginia, Ohio, s. Illinois, and Kansas to Louisiana and e. Texas.
  ⍋Ψ CHINESE CATALPA, *C. ovata* (not illus.) p. 86



PRINCESS-TREE



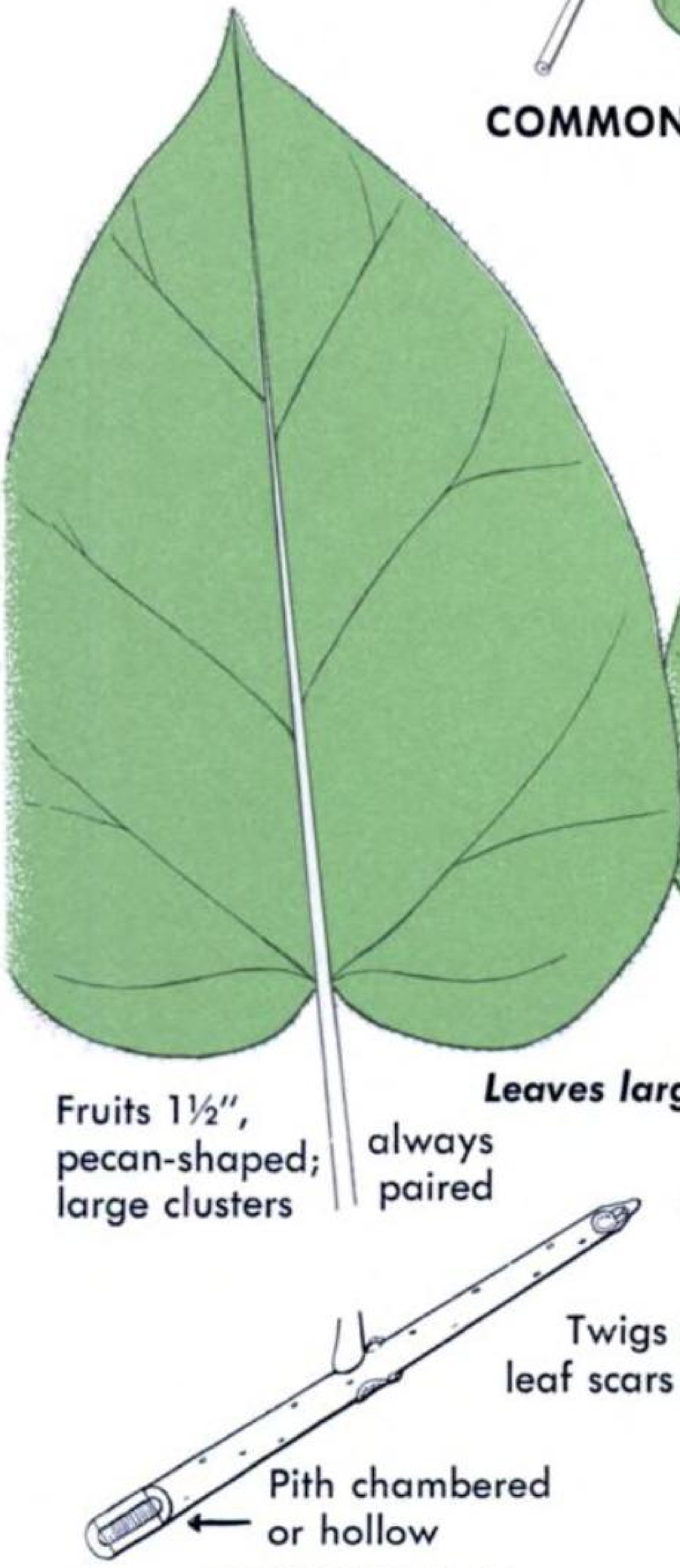
COMMON CATALPA



Leaves 2″–3½″, tips tapered

Twigs medium to stout; scars not circular

COMMON LILAC

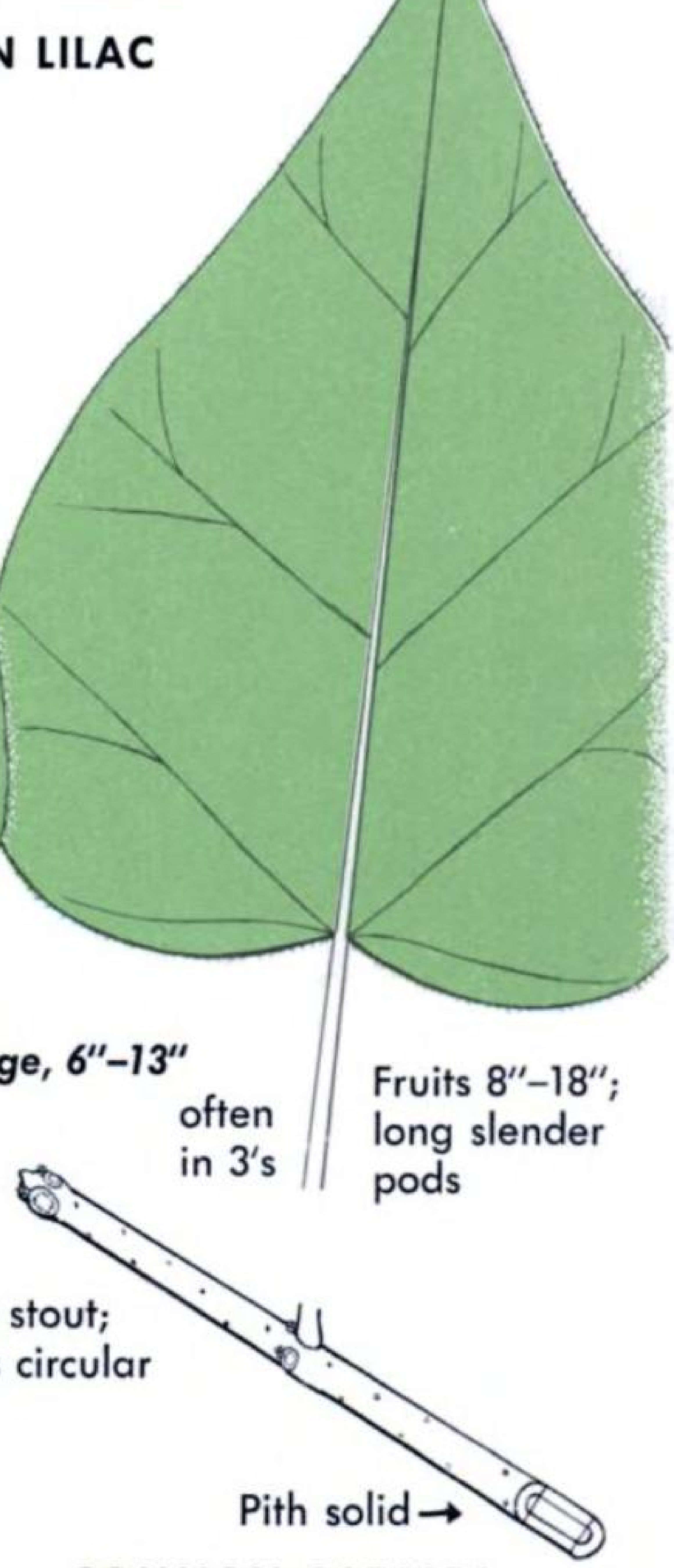


Fruits 1½″, pecan-shaped; large clusters

always paired

Pith chambered or hollow ←

PRINCESS-TREE



often in 3′s

Fruits 8″–18″; long slender pods

Pith solid →

COMMON CATALPA

Leaves large, 6″–13″

Twigs stout; leaf scars circular

SHRUBS WITH OPPOSITE TOOTHED LEAVES

Along with the viburnums (Plate 20), the only erect plants with unlobed leaves of this type. Several are of limited distribution.

Ψ NORTHERN BUSH-HONEYSUCKLE p. 86
Diervilla lonicera
Woods openings, dry soils; Newfoundland and Manitoba to Delaware, w. N. Carolina, Ohio, and Iowa.
Ψ SOUTHERN BUSH-HONEYSUCKLE p. 86
D. sessilifolia (not illus.)

Ψ WILD HYDRANGEA, *Hydrangea arborescens* p. 87
Damp woods; s. New York, Ohio, and Missouri to n. Florida, Louisiana, and Oklahoma.
Ψ ASIATIC HYDRANGEA, *H. paniculata* (not illus.) p. 87
Ψ OAKLEAF HYDRANGEA, *H. quercifolia* (not illus.) p. 87

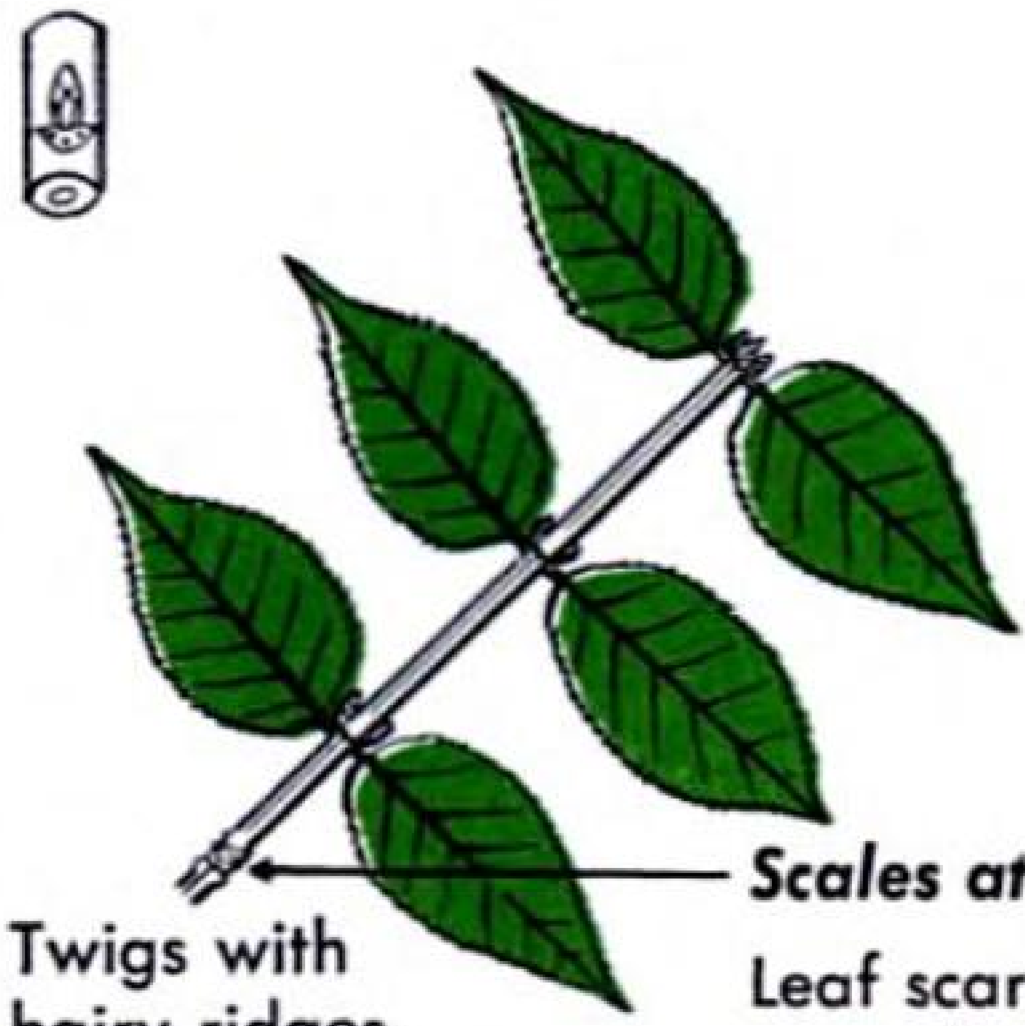
↑Ψ BURNINGBUSH, *Euonymus atropurpureus* p. 87
Damp woods; w. New York, s. Ontario, s. Michigan, centr. Minnesota, and Montana to e. Virginia, n. Alabama, Arkansas, and Oklahoma.
↑Ψ EUROPEAN SPINDLETREE p. 88
E. europaeus (not illus.)

Ψ COMMON BUCKTHORN, *Rhamnus cathartica* p. 88
Hedgerows, thickets; Nova Scotia, s. Quebec, s. Ontario, s. Wisconsin, and e. N. Dakota to Virginia, Ohio, and Missouri.

↑Ψ SWAMP FORESTIERA, *Forestiera acuminata* p. 88
Coastal Plain swamps and riverbanks; S. Carolina and n. Florida, west to e. Texas, and north in Mississippi Valley to s. Indiana, centr. Illinois, se. Kansas, and s. Oklahoma.
Ψ UPLAND FORESTIERA, *F. ligustrina* (not illus.) p. 88
Ψ BEAUTYBERRY, *Callicarpa americana* (not illus.) p. 89

Ψ COMMON MOCK-ORANGE, *Philadelphus inodorus* p. 89
Streambanks and thickets; Virginia and Tennessee to Florida and Alabama, occasionally spreading from cultivation to the North.
Ψ HAIRY MOCK-ORANGE, *P. hirsutus* (not illus.) p. 89
Ψ GARDEN MOCK-ORANGE
P. coronarius (not illus.) p. 89
Ψ GRAY MOCK-ORANGE, *P. pubescens* (not illus.) p. 90

Ψ MARSH-ELDER, *Iva frutescens* (not illus.) p. 90

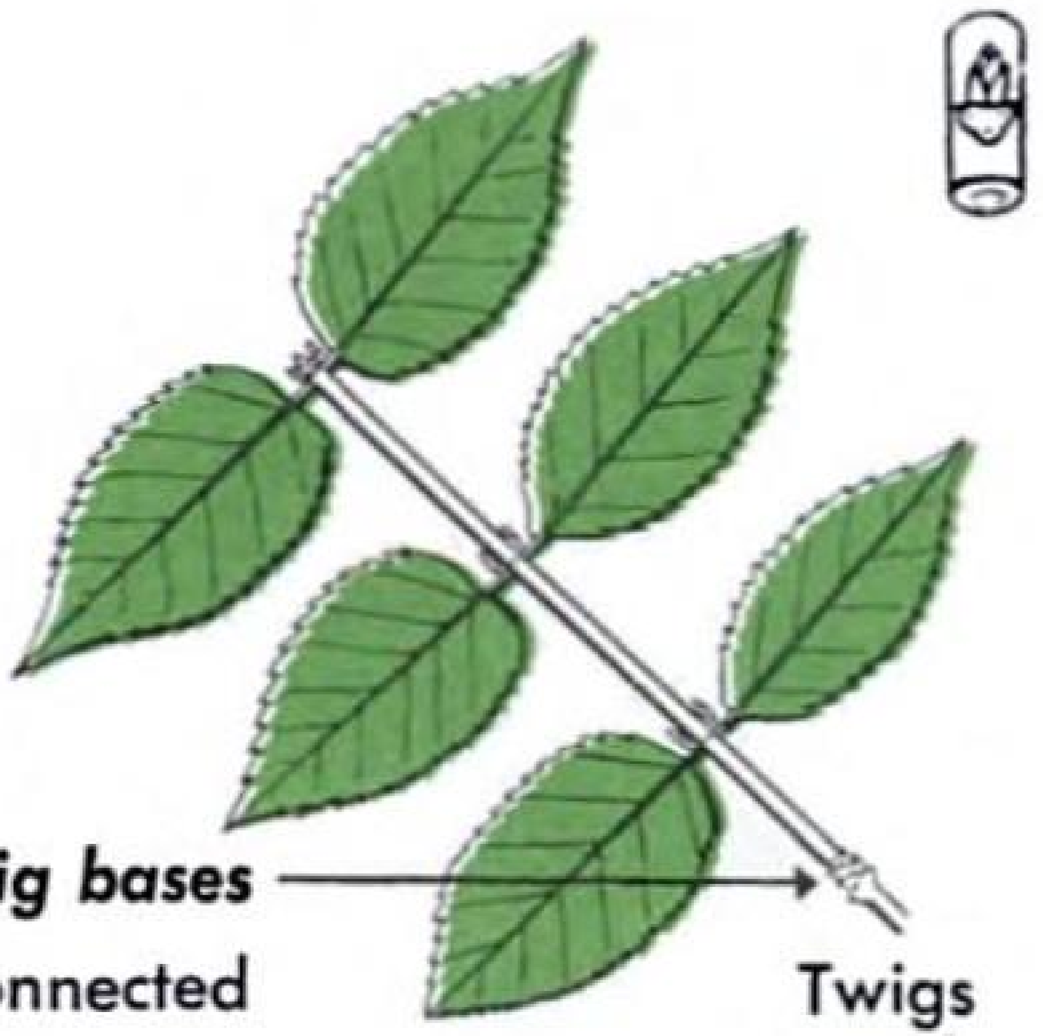


Twigs with hairy ridges

NORTHERN BUSH-HONEYSUCKLE

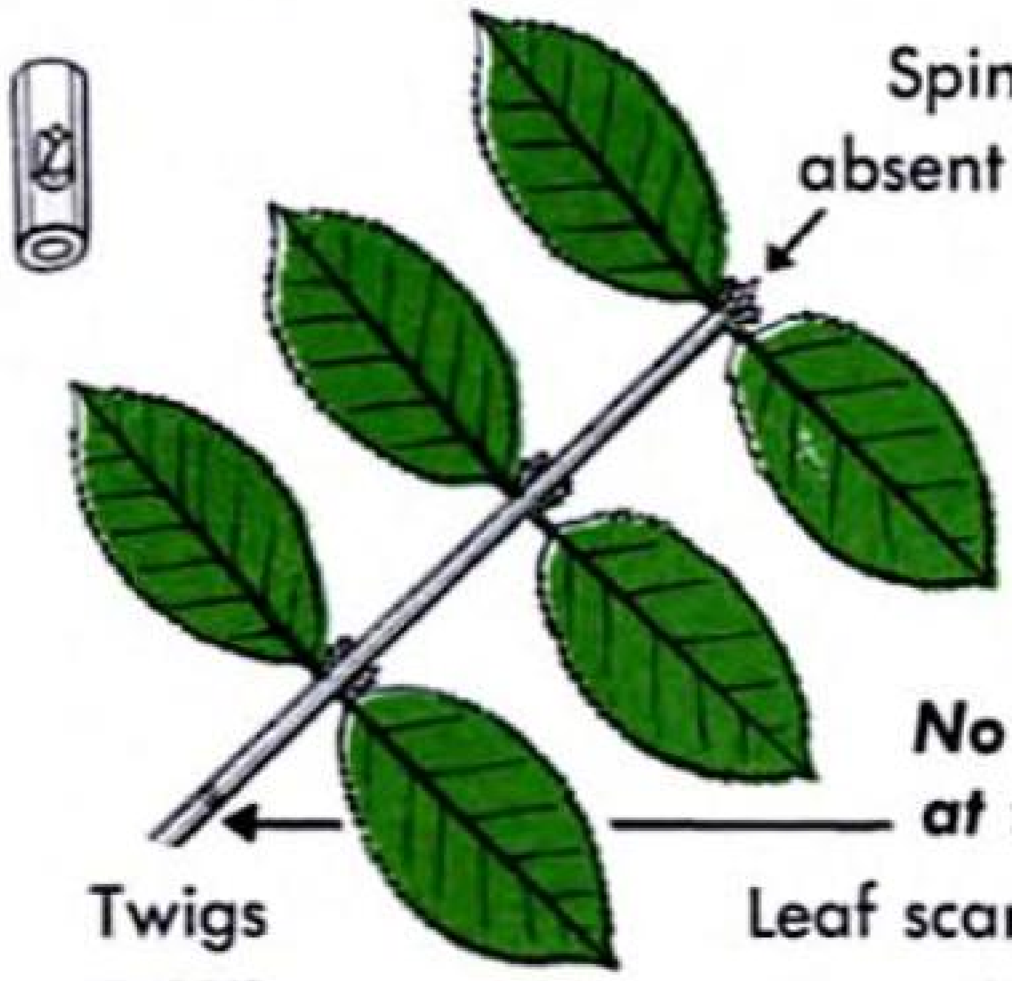
Scales at twig bases

Leaf scars connected by lines



Twigs smooth

WILD HYDRANGEA



Spiny twig tips absent

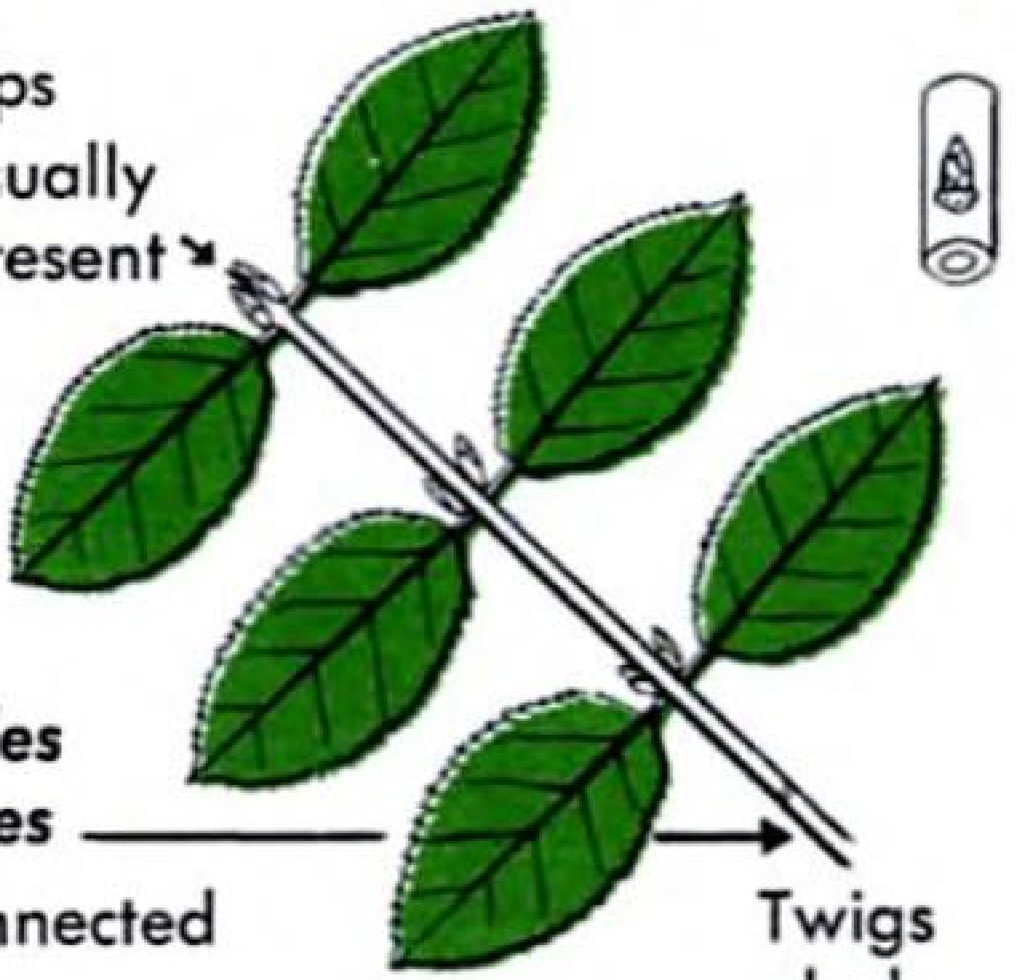
Twigs green, 4-lined

BURNINGBUSH

No bud scales at twig bases

Leaf scars not connected

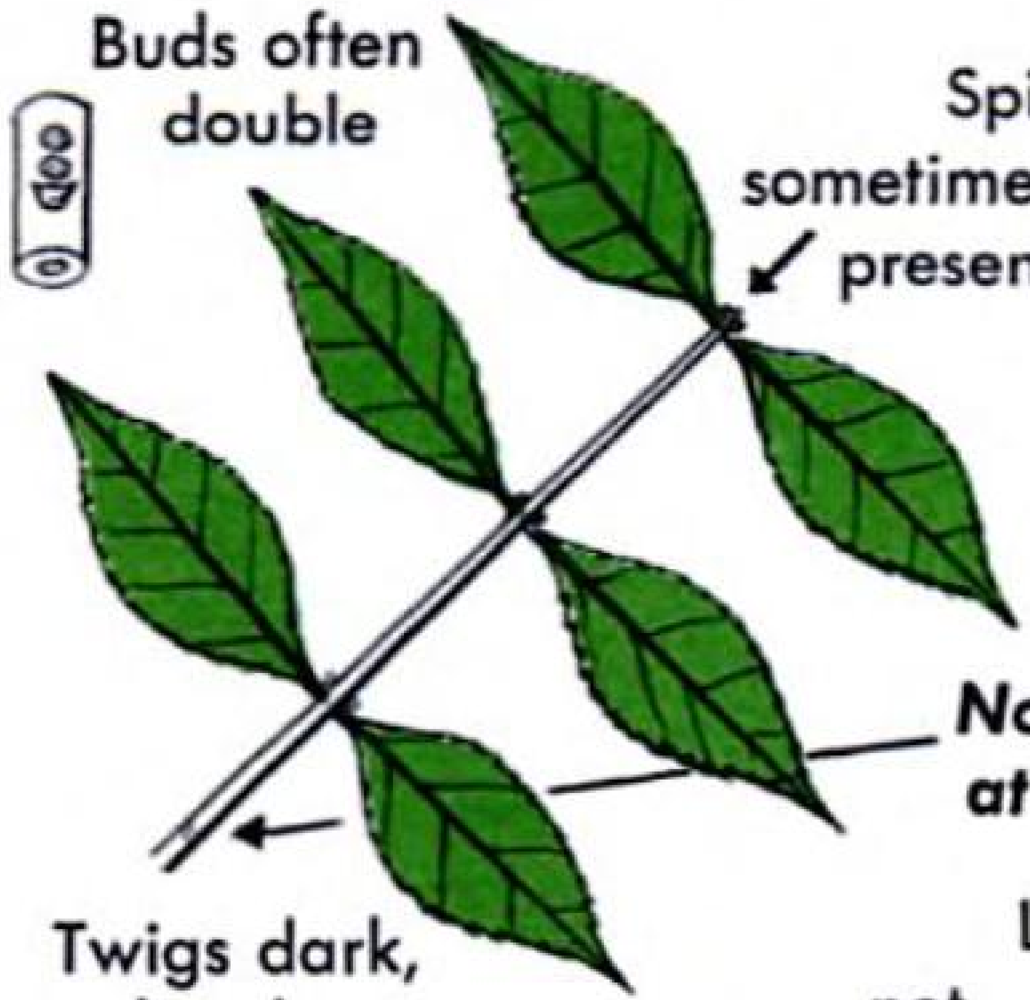
Inner bark not yellow / yellow



Spiny twig tips usually present

Twigs dark, unlined

COMMON BUCKTHORN



Buds often double

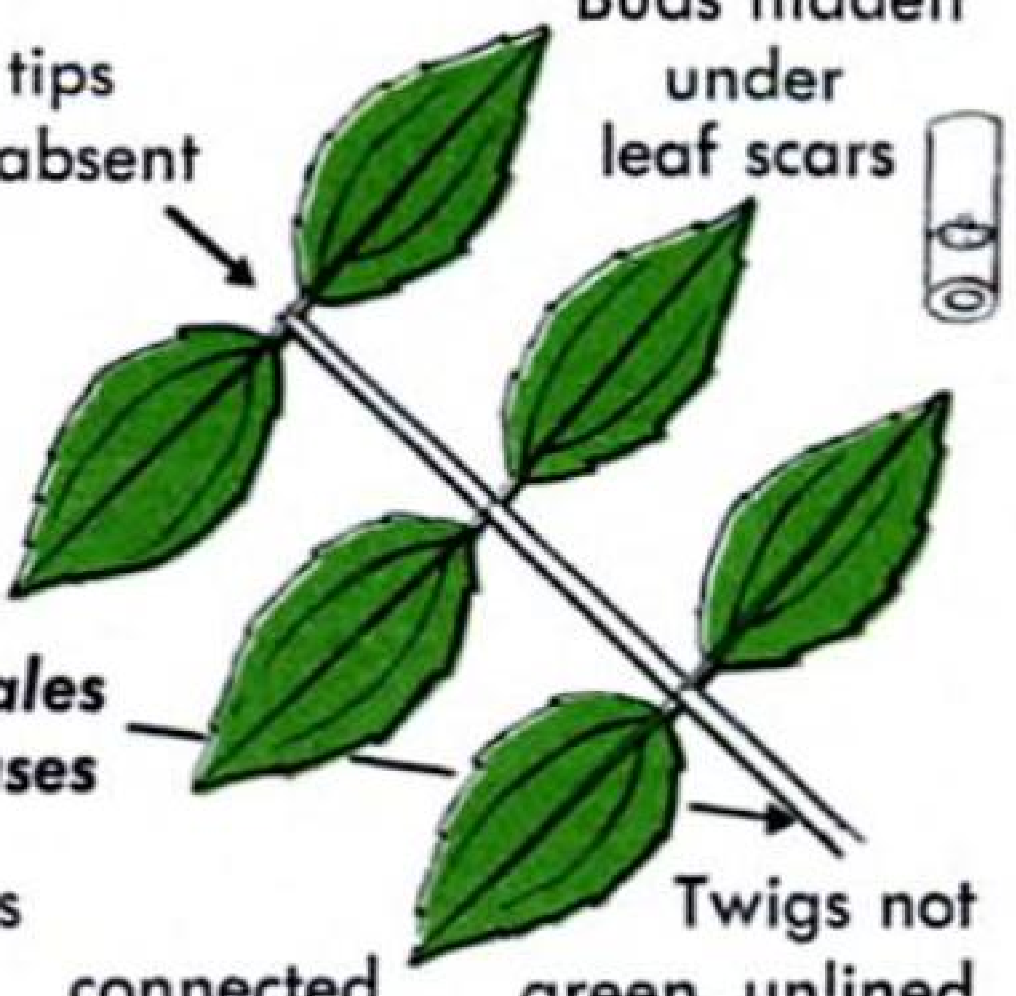
Spiny twig tips sometimes present

Twigs dark, unlined

Leaf scars not connected

SWAMP FORESTIERA

No bud scales at twig bases



Spiny twig tips absent

Buds hidden under leaf scars

Leaf scars connected by line

Twigs not green, unlined

COMMON MOCK-ORANGE

VIBURNUMS (1)

Identify by subgroups (opposite and on Plate 21). All species except top 2 have very narrow, opposite leaf scars.

↑ψ WAYFARING-TREE, *Viburnum lantana* p. 91
Escaped from cultivation; Connecticut to s. Ontario.

ψ HOBBLEBUSH, *Viburnum alnifolium* p. 91
Moist woods; Prince Edward I. and Ontario to n. New Jersey, Pennsylvania, and ne. Ohio, and in mts. to Tennessee and Georgia.

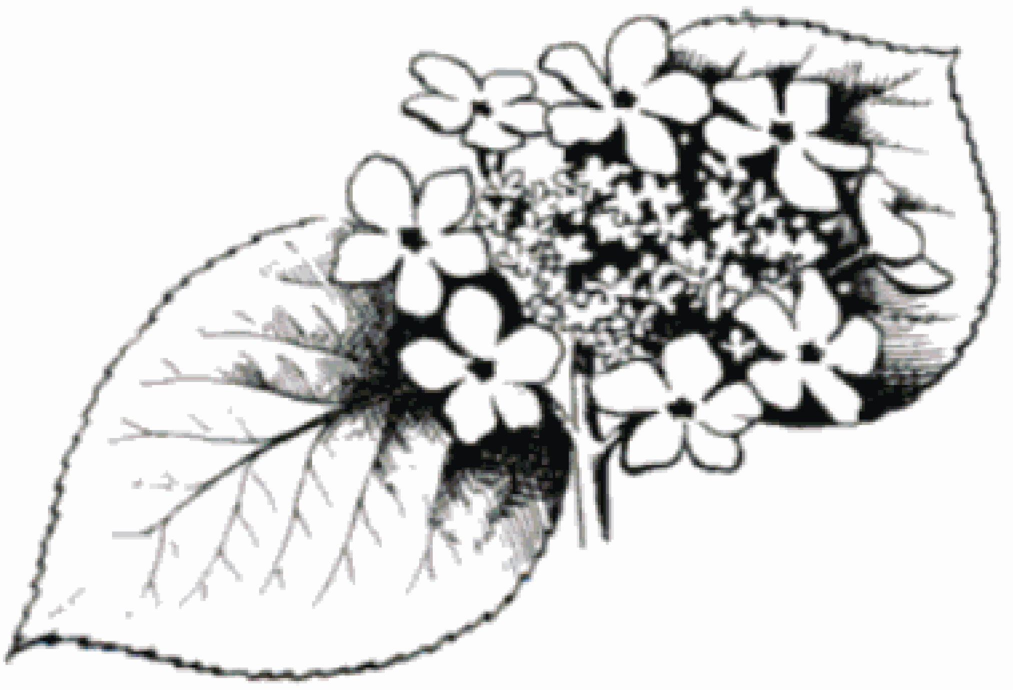
↑ψ SMOOTH BLACKHAW, *Viburnum prunifolium* p. 91
Woods and hedgerows; Connecticut, s. Michigan, Iowa, and e. Kansas to n. Florida and Texas.

↑ψ RUSTY BLACKHAW, *Viburnum rufidulum* p. 92
Woods and thickets; Virginia, s. Ohio, s. Illinois, Missouri, and se. Kansas to Florida and Texas.

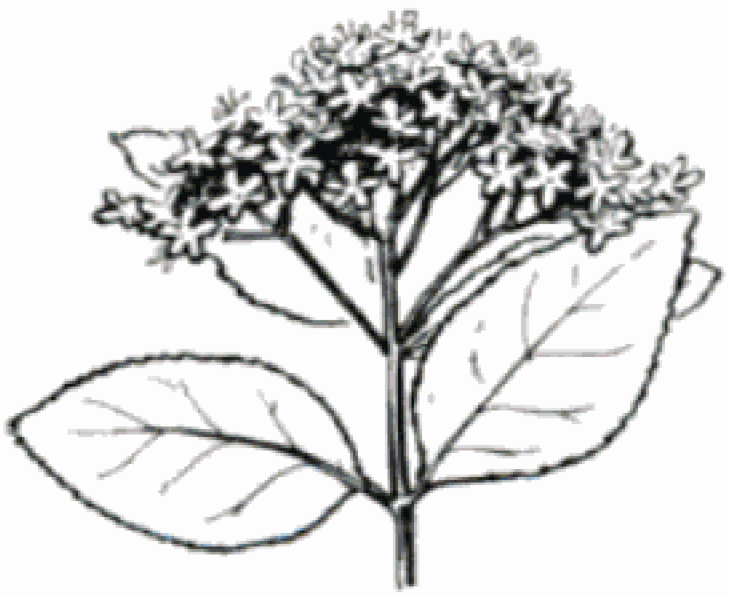
↑ψ NANNYBERRY, *Viburnum lentago* p. 92
Woods; New England, w. Quebec, and Manitoba to New Jersey, Ohio, ne. Missouri, and Colorado; in Appalachians to N. Carolina and Georgia.

ψ NORTHERN WILD-RAISIN, *Viburnum cassinoides* p. 92
Swamps and thickets; Newfoundland and w. Ontario to Delaware, Maryland, Ohio, n. Indiana, and Wisconsin; in mts. to Alabama.

↑ψ SOUTHERN WILD-RAISIN, *Viburnum nudum* p. 92
Coastal Plain wet woods and bogs; s. Connecticut to Florida, west to e. Texas, and north in the Mississippi Valley to Kentucky and Arkansas.

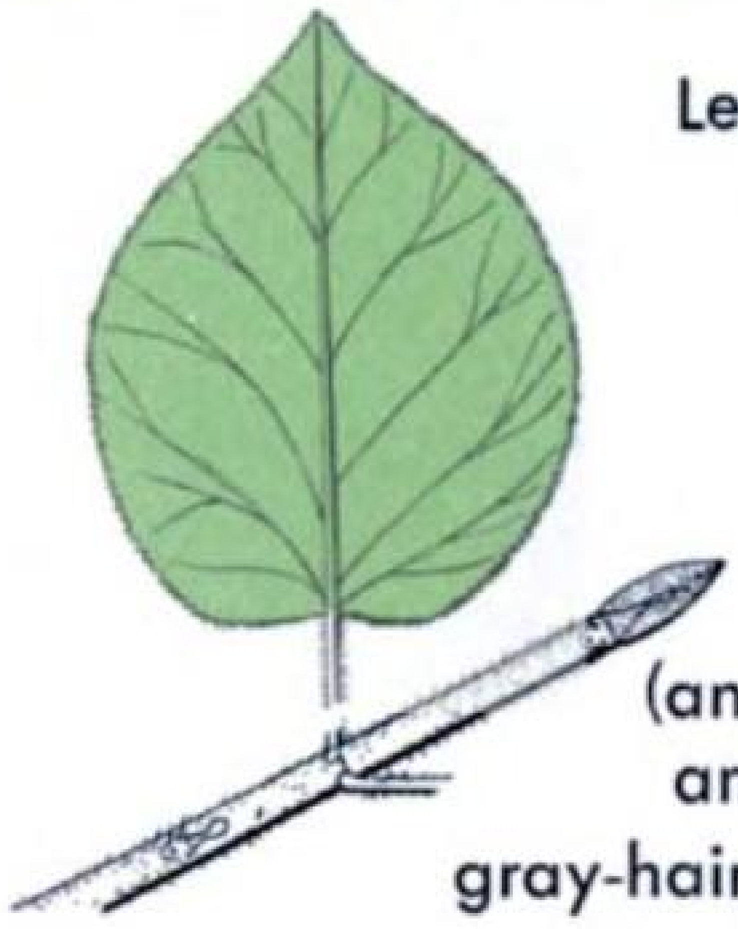


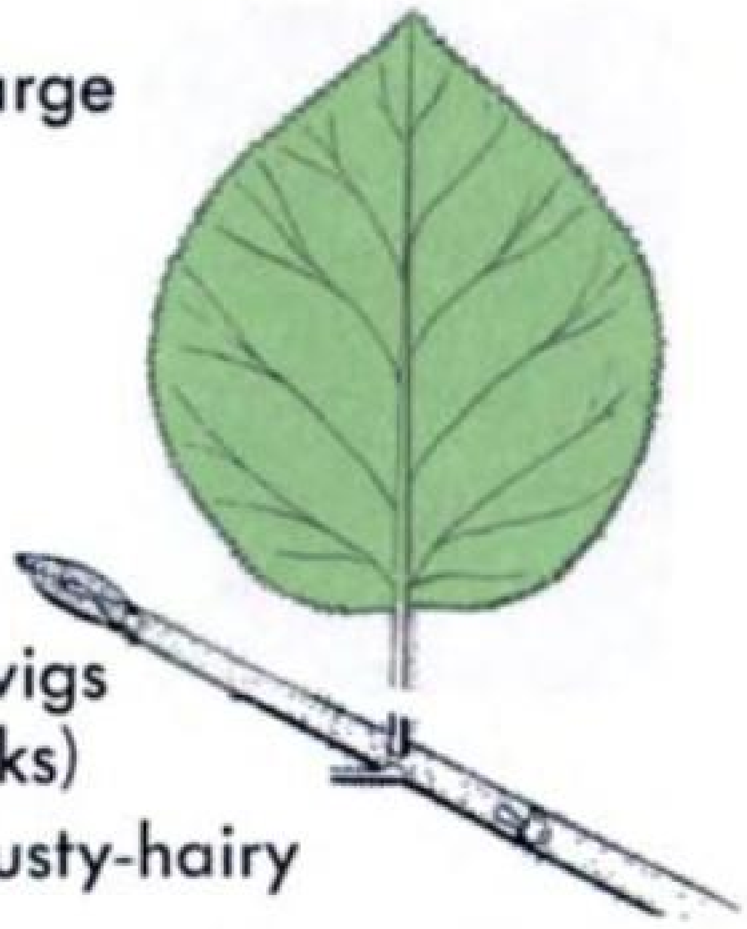
HOBBLEBUSH



OTHER VIBURNUMS
on this plate have flower clusters of this type

Leaves finely toothed, heart-shaped; buds without scales





Leaf scars large

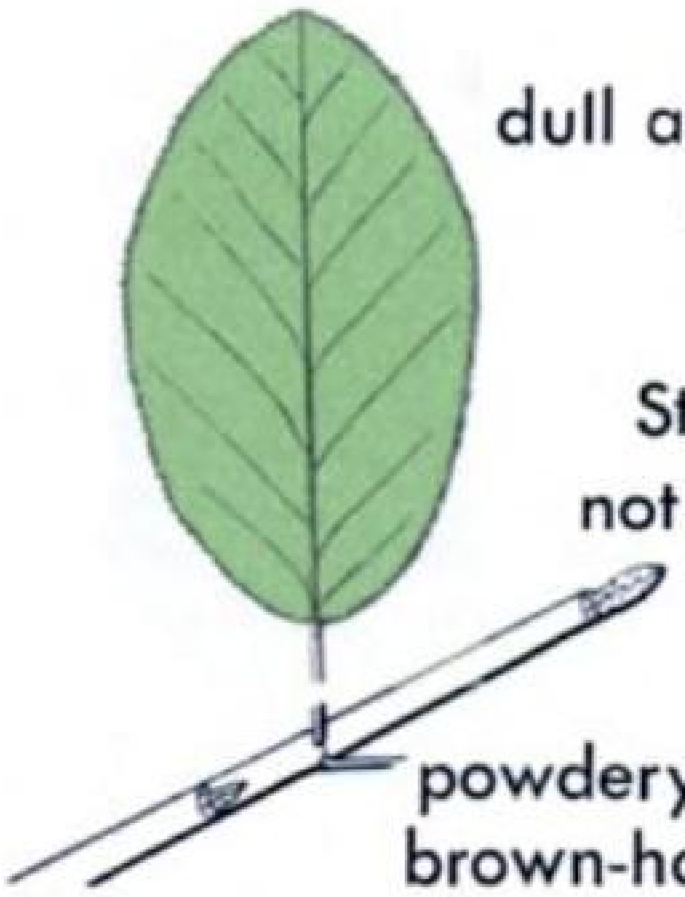
Buds
(and often twigs
and leafstalks)

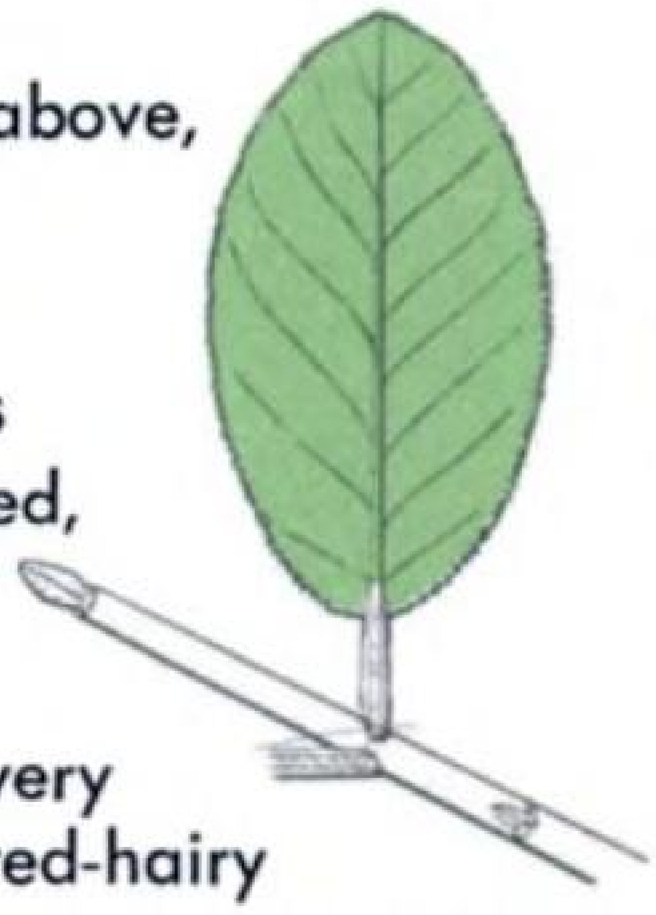
gray-hairy rusty-hairy

WAYFARING-TREE **HOBBLEBUSH**

Leaves oval, finely toothed or not; buds with 2 scales

Side twigs mostly short and stiff; leaves often wide





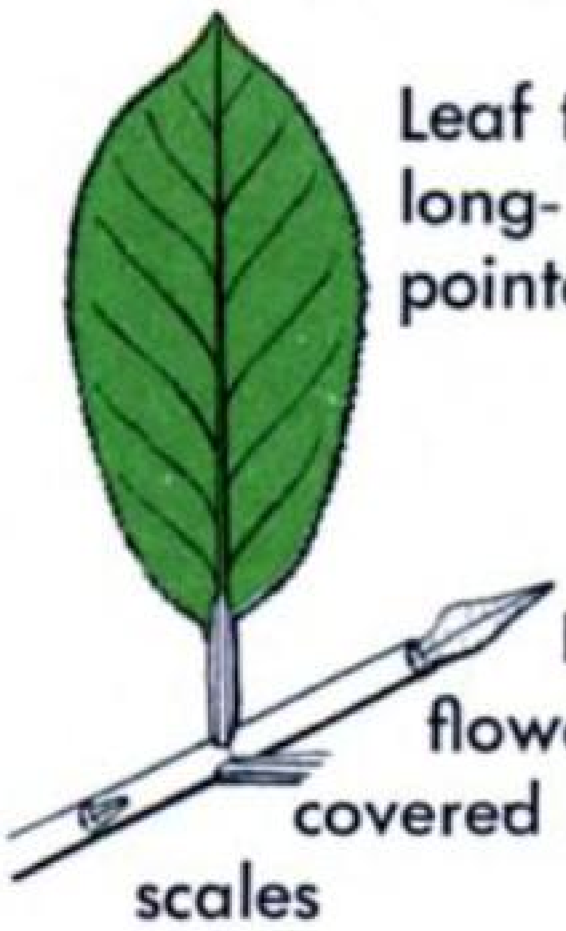
Leaves
dull above, never red-hairy beneath
shiny above, often red-hairy beneath

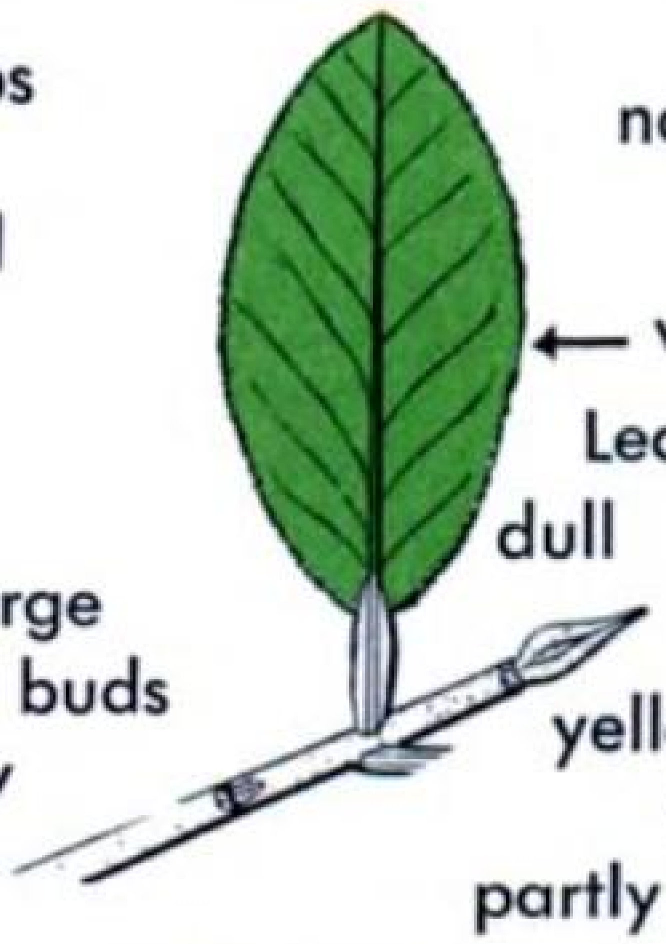
Stalks of upper leaves
not winged, hairless
winged, hairy

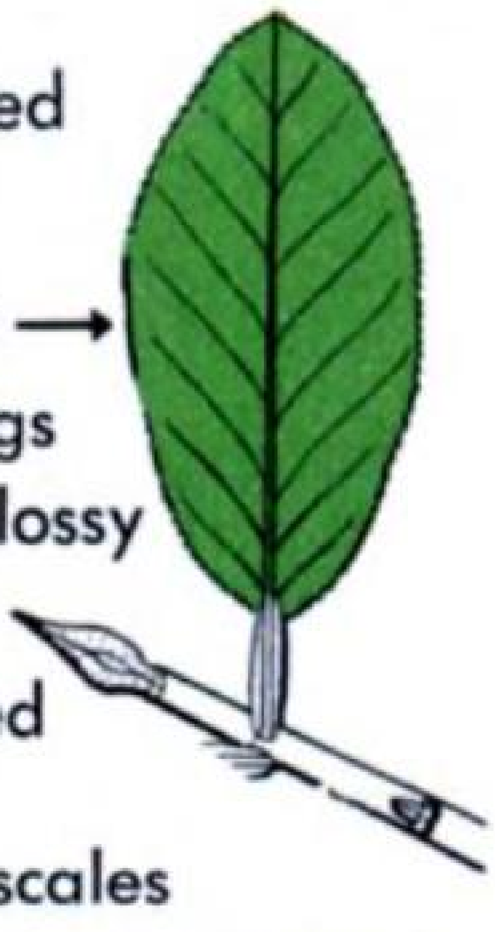
Buds
powdery or brown-hairy
very red-hairy

SMOOTH BLACKHAW **RUSTY BLACKHAW**

Side twigs long and flexible; leaves rarely wide.
Buds hairy or powdery; stalks of upper leaves "winged"







Leaf tips long-pointed

Large flower buds covered by scales

Leaf tips not long-pointed

often ← without teeth →

Leaves and twigs
dull glossy

Large
yellow red
flower buds
partly covered by scales

NANNYBERRY **NORTHERN WILD-RAISIN** **SOUTHERN WILD-RAISIN**

VIBURNUMS (2)

Identify by subgroups (opposite and on Plate 20).

ψ NORTHERN ARROWWOOD, *Viburnum recognitum* p. 93
Woods; New Brunswick and s. Ontario to se. New York, n. Ohio, and Michigan.

ψ SOUTHERN ARROWWOOD, *Viburnum dentatum* p. 93
Woods and thickets; se. Massachusetts, Pennsylvania, and e. Missouri to Florida and Texas.

ψ SHORTSTALK ARROWWOOD p. 93
Viburnum rafinesquianum
Woods; sw. Quebec and Manitoba to Georgia, Kentucky, and Missouri.

ψ SOFTLEAF ARROWWOOD, *Viburnum molle* p. 94
Rocky woods; Indiana and Missouri to Kentucky and Arkansas.
ψ SIEBOLD VIBURNUM, *V. sieboldii* (not illus.) p. 94

ψ CRANBERRY VIBURNUM p. 94
(HIGHBUSH-CRANBERRY) *Viburnum trilobum*
Woods and low places; Newfoundland and British Columbia to New England, Pennsylvania, n. Ohio, n. Illinois, ne. Iowa, sw. S. Dakota, se. Wyoming, and Washington.
ψ GUELDER-ROSE, *V. opulus* (not illus.) p. 95

ψ SQUASHBERRY, *Viburnum edule* p. 95
Woods; Newfoundland, Labrador, and Alaska to n. New England, w. Pennsylvania, n. Michigan, n. Wisconsin, n. Minnesota, Colorado, and Oregon.

ψ MAPLELEAF VIBURNUM, *Viburnum acerifolium* p. 95
Woods; sw. Quebec and Minnesota to New England, Georgia, and Tennessee.

Leaves with a single main midrib, not lobed

Bud scales several

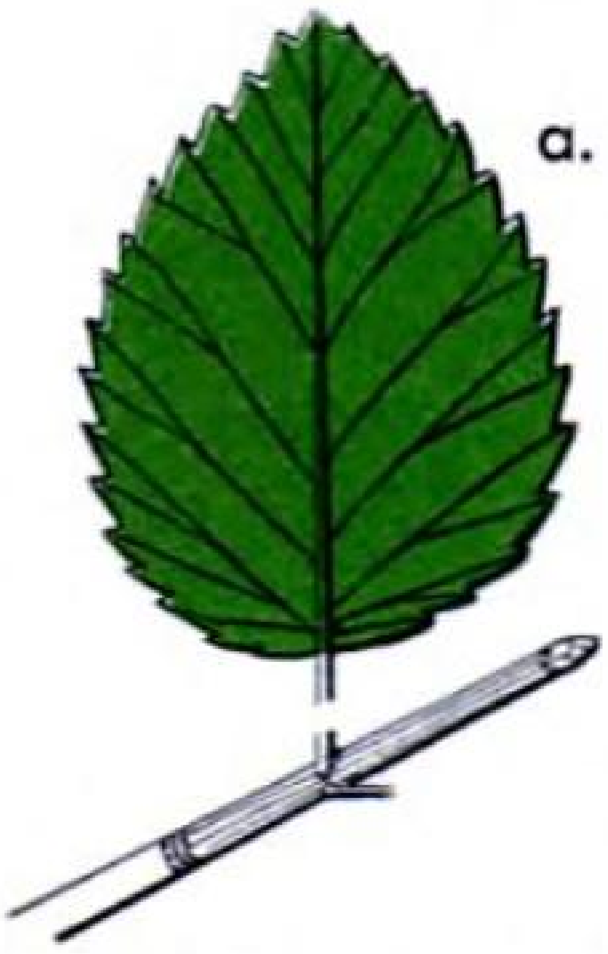
a. Leaves hairless or slightly hairy beneath; twigs often ridged

Leaves with 4–22 pairs of teeth

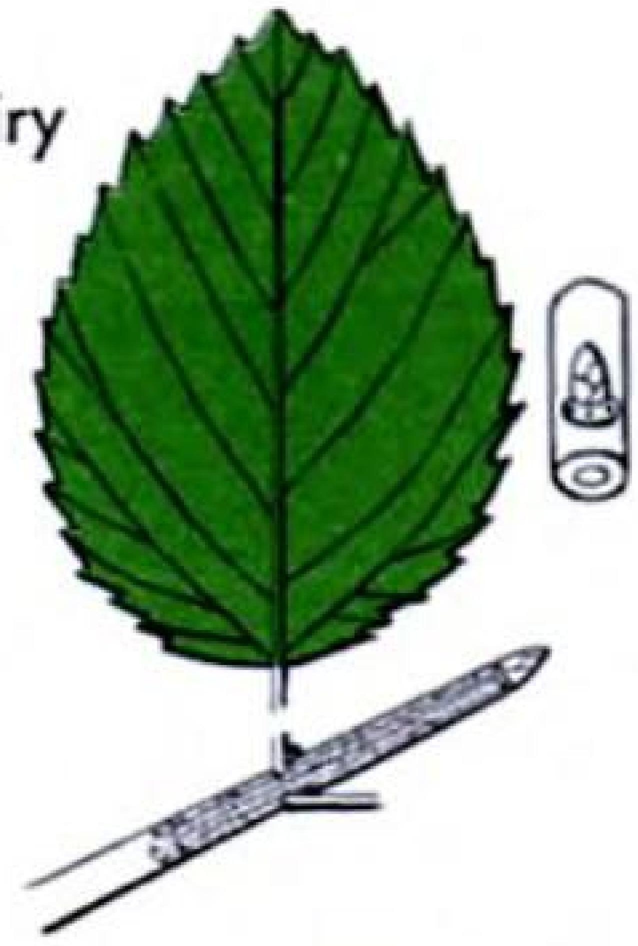
Leaf bases rounded or slightly heart-shaped

Twigs

hairless velvety-hairy



NORTHERN ARROWWOOD



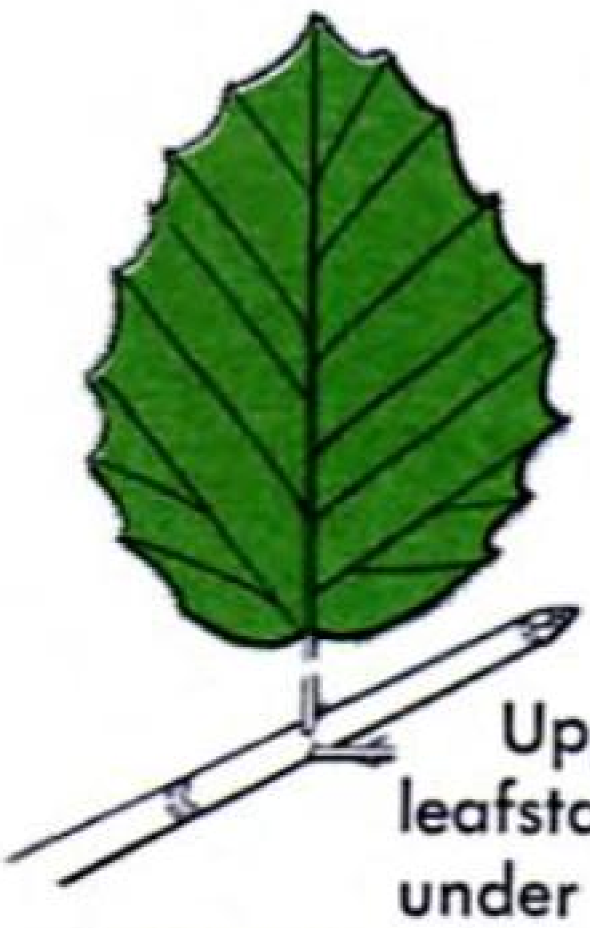
SOUTHERN ARROWWOOD

b. Leaves velvety-hairy beneath; twigs not ridged

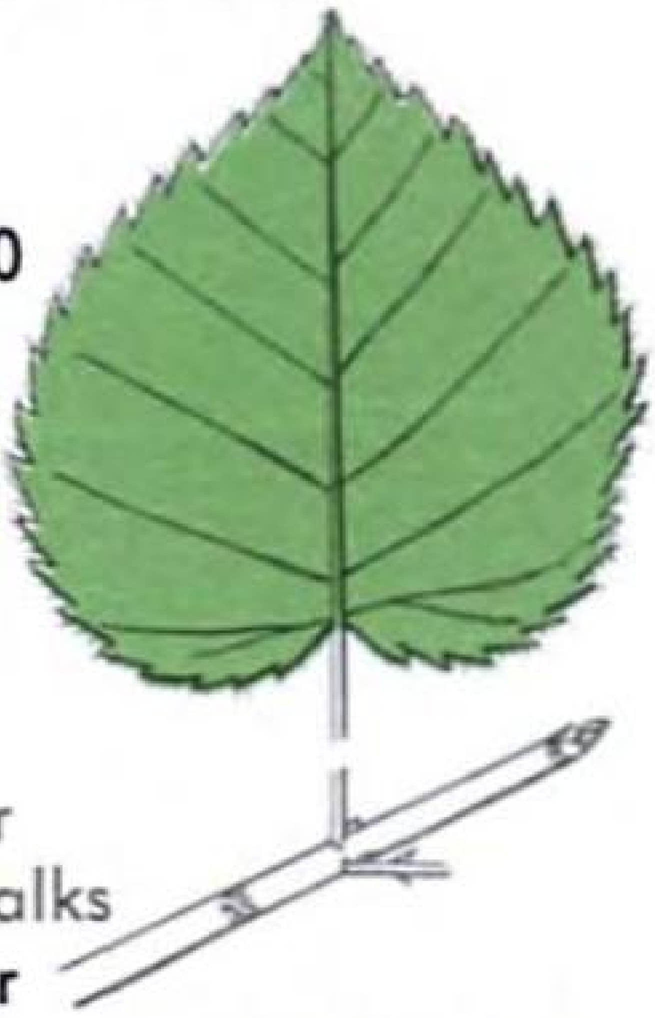
Leaves with 4–10 20–30 pairs of teeth

Leaf bases heart-shaped

Twigs hairless

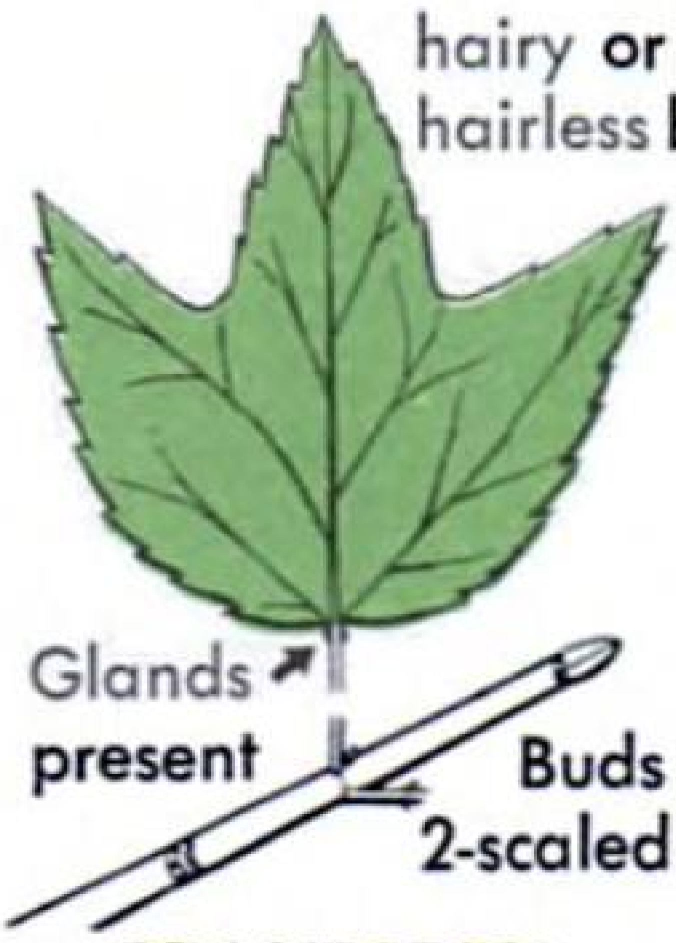

Upper leafstalks under ¼"

SHORTSTALK ARROWWOOD

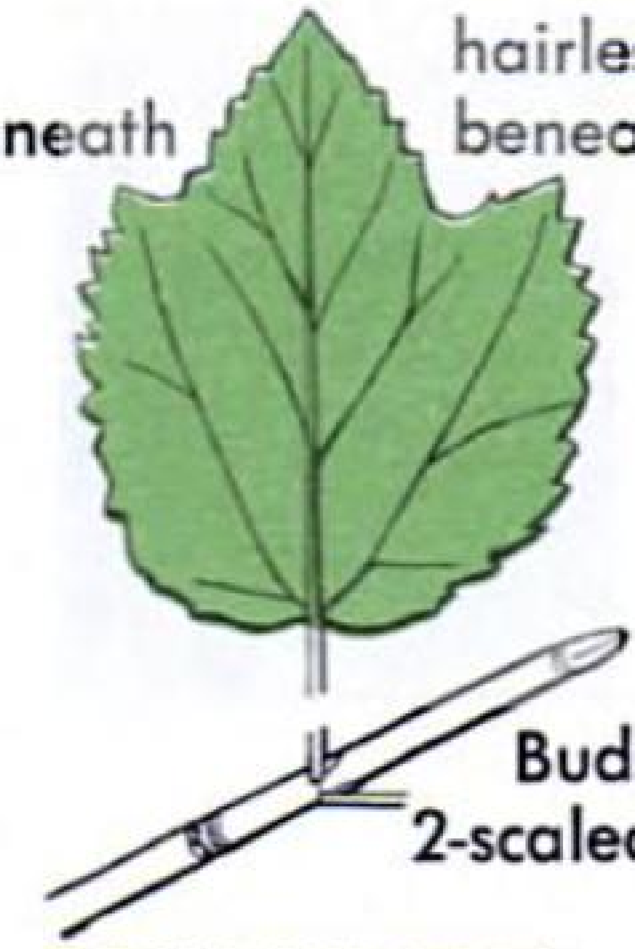

Upper leafstalks longer

SOFTLEAF ARROWWOOD

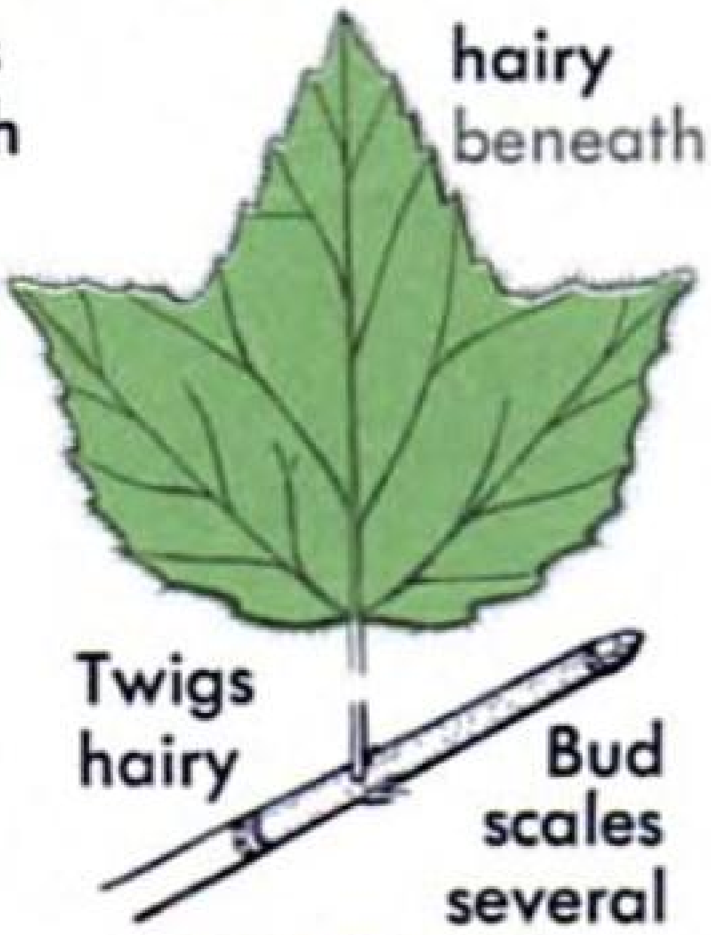
Leaves lobed, 3–5 main veins meeting near base


hairy or hairless beneath
Glands present
Buds 2-scaled

CRANBERRY VIBURNUM


hairless beneath
Buds 2-scaled

SQUASHBERRY


hairy beneath
Twigs hairy
Bud scales several

MAPLELEAF VIBURNUM

MAPLES

The only trees with opposite 3- to 5-lobed leaves. See also Plate 21 (Viburnums 2).

🌲 STRIPED MAPLE (MOOSEWOOD) p. 96
Acer pensylvanicum
Woods; Nova Scotia, Quebec, centr. Michigan, and Manitoba to New England, Pennsylvania, and Ohio; in mts. to Tennessee and n. Georgia.

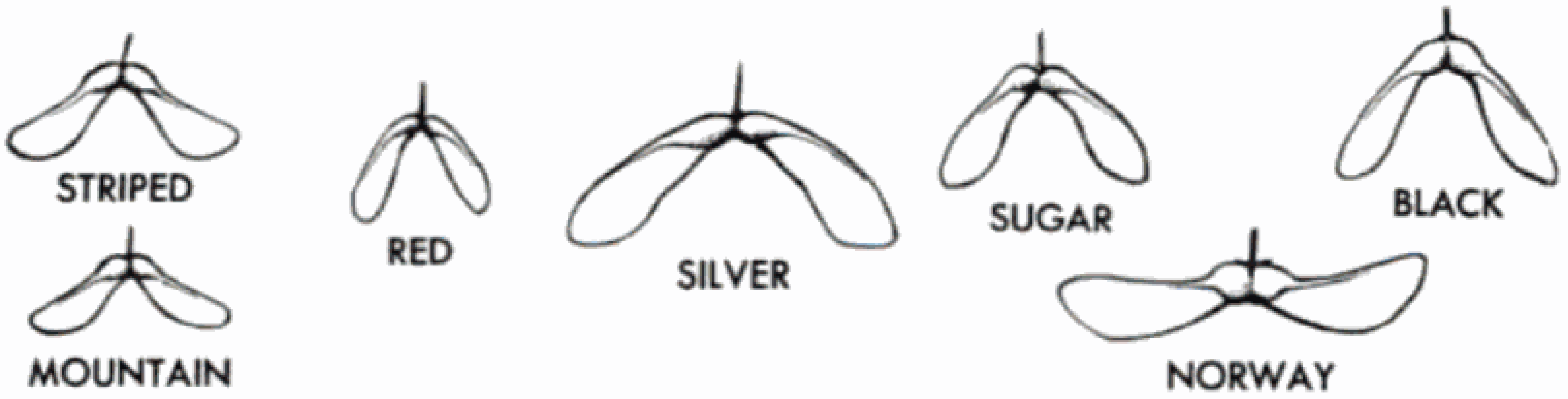
🌲 MOUNTAIN MAPLE, *Acer spicatum* p. 96
Woods; Newfoundland and e. Saskatchewan to n. New Jersey, Pennsylvania, n. Ohio, Michigan, ne. Iowa, and Minnesota; in mts. to n. Georgia and Tennessee.
🌲⋎ SIBERIAN MAPLE, A. *ginnala* (not illus.) p. 96

🌲 RED MAPLE, *Acer rubrum* p. 96
Wet woods and second growth; Newfoundland, Ontario, and se. Manitoba to Florida and e. Texas.

🌲 SILVER MAPLE, *Acer saccharinum* p. 97
Riverbanks and floodplains; New Brunswick, s. Ontario, and Minnesota to nw. Florida and e. Oklahoma.
🌲 SYCAMORE MAPLE
A. *pseudo-platanus* (not illus.) p. 97

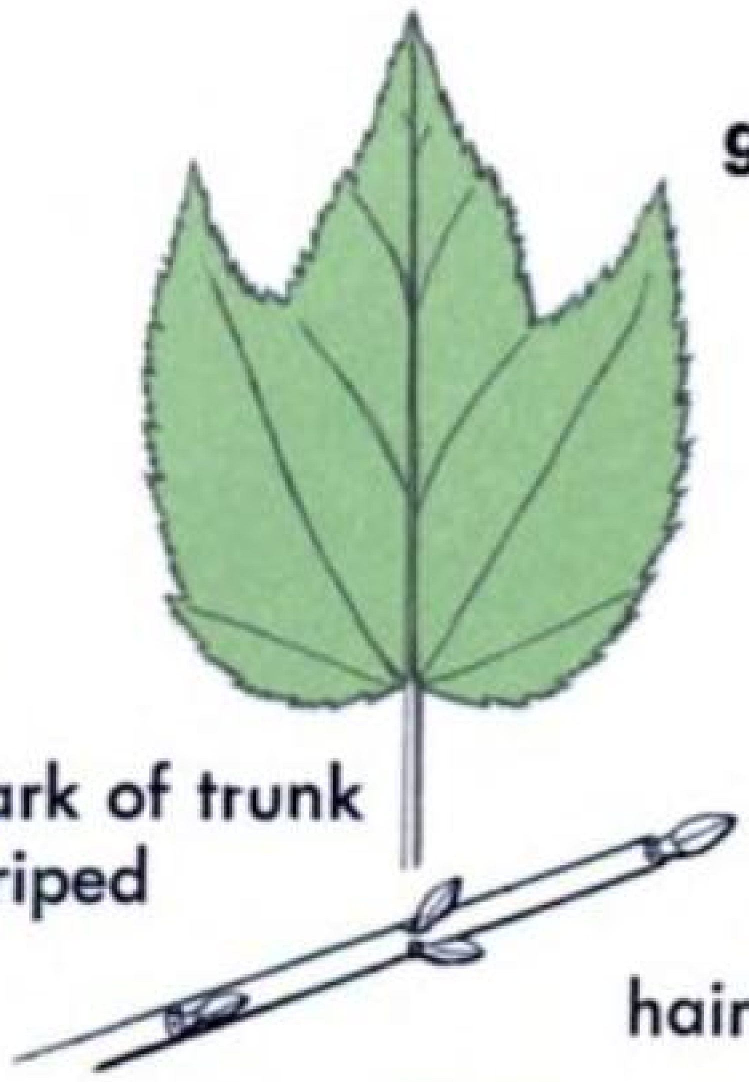
🌲 SUGAR MAPLE, *Acer saccharum* p. 97
Mature upland forests; Newfoundland, Nova Scotia, Quebec, and sw. Manitoba to Virginia, n. Georgia, and e. Texas.
🌲 FLORIDA MAPLE, A. *barbatum* (not illus.) p. 98

🌲 BLACK MAPLE, *Acer nigrum* p. 98
Mature upland woods; sw. Quebec, Vermont, s. Ontario, se. Minnesota, and ne. S. Dakota to New Jersey, w. Virginia, w. N. Carolina, Kentucky, and ne. Kansas.
🌲 NORWAY MAPLE, A. *platanoides* (fruit illus.) p. 98
🌲⋎ HEDGE MAPLE, A. *campestre* (not illus.) p. 98



"KEYS" (x¼)

Leaves green on both sides

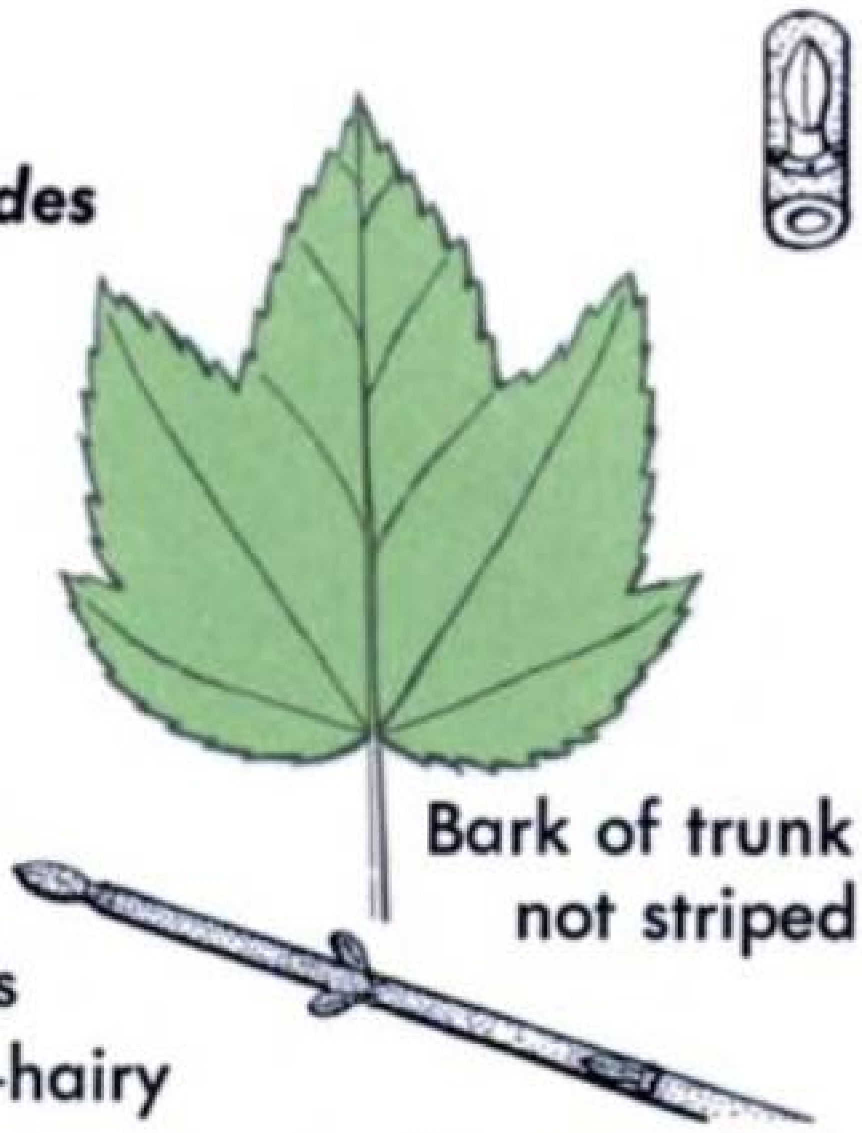


Bark of trunk striped

STRIPED

Bud scales 2

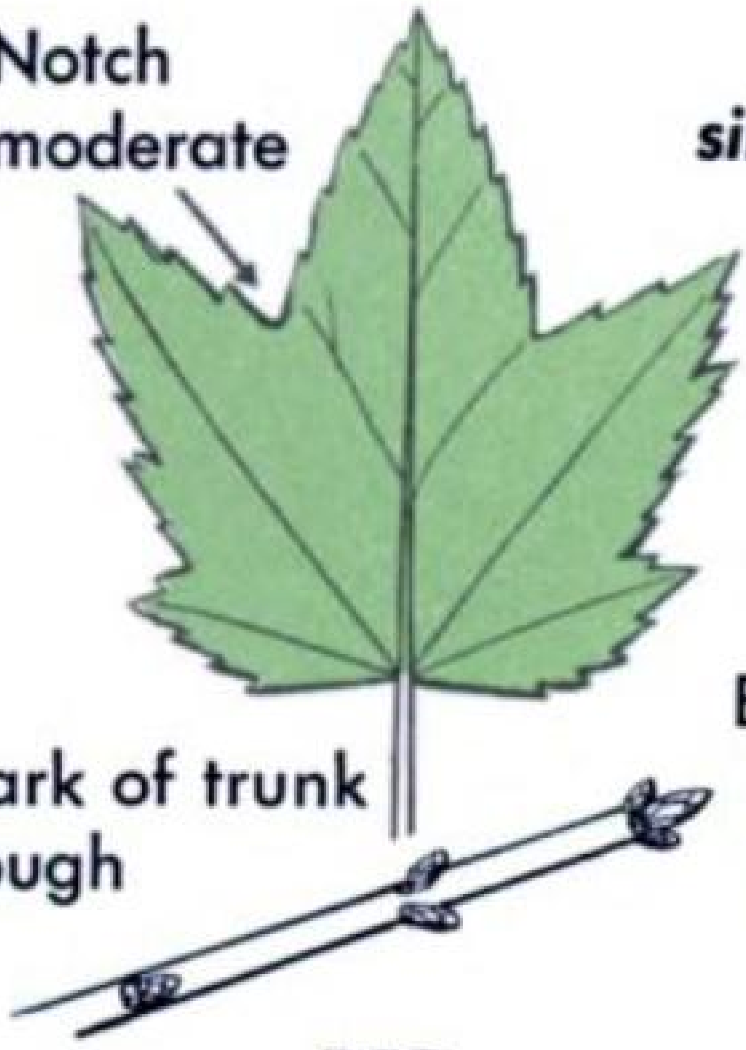
Twigs and buds
hairless velvety-hairy



Bark of trunk not striped

MOUNTAIN

Leaves silvery white beneath



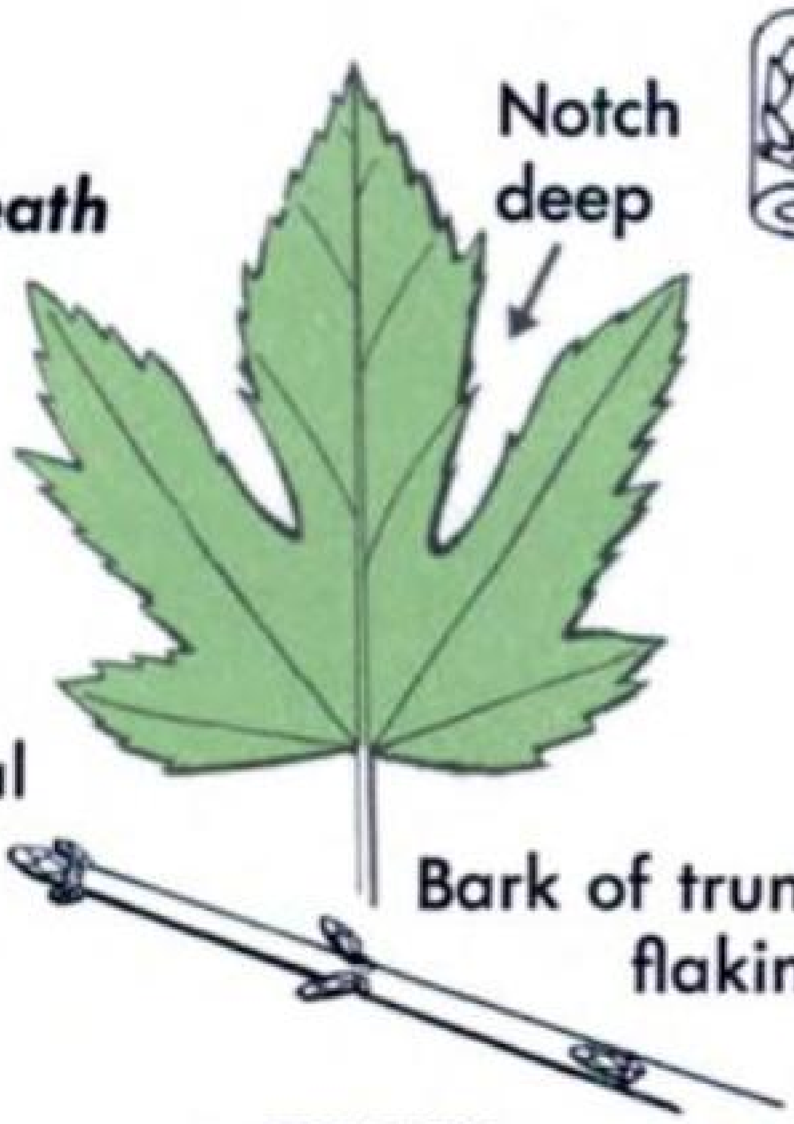
Notch moderate

Bark of trunk rough

RED

Bud scales several

Buds red, blunt



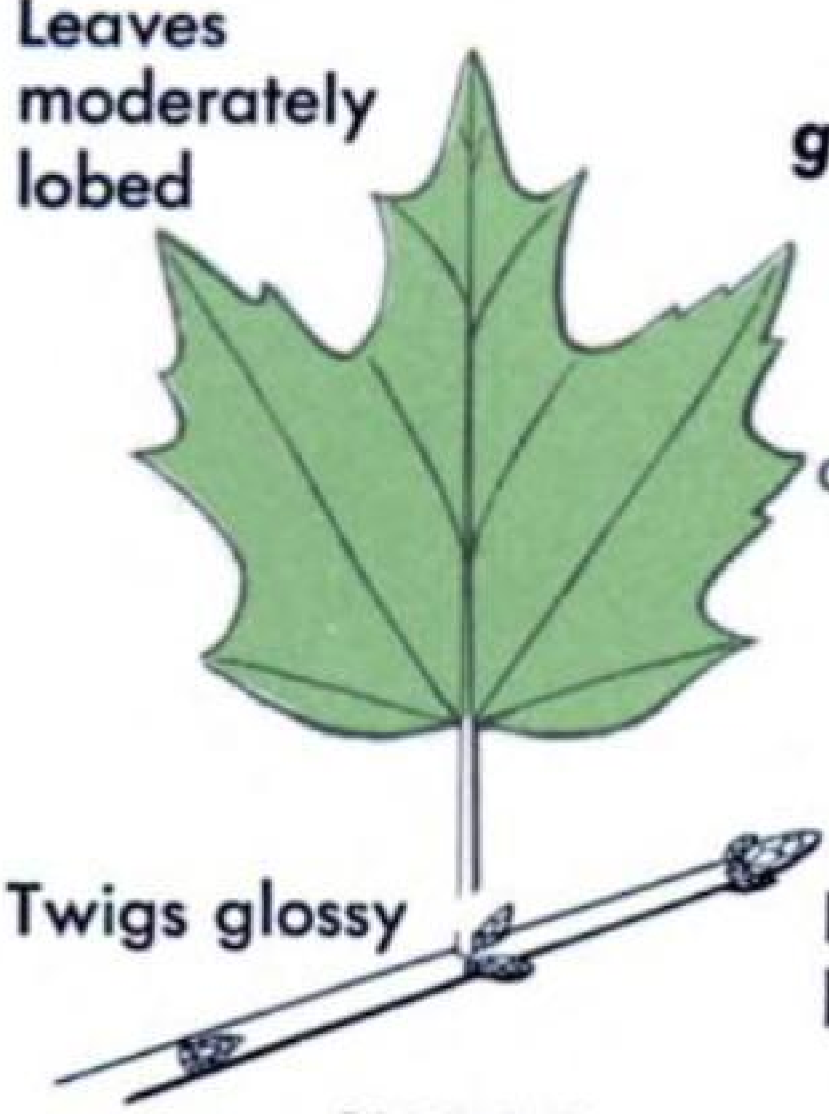
Notch deep

Bark of trunk flaking

SILVER

Leaves green on both sides

Edges
not drooping drooping

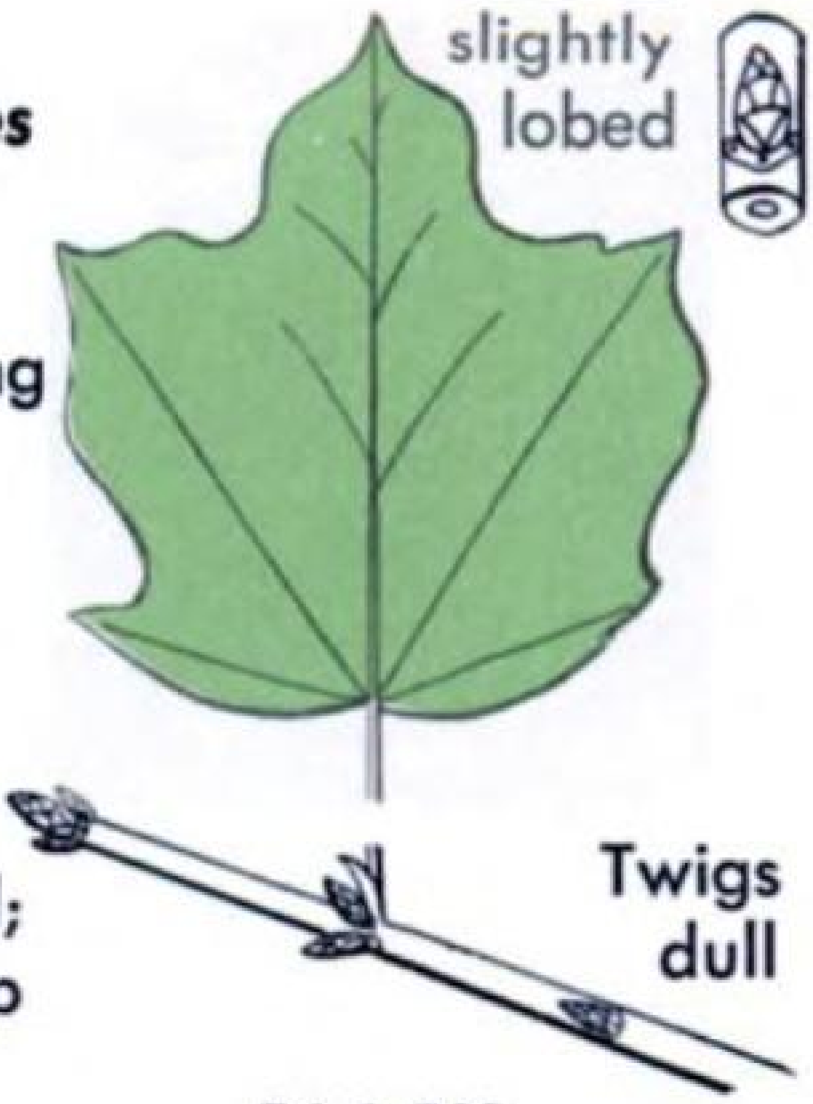


Leaves moderately lobed

Twigs glossy

SUGAR

Bud scales several; buds brown, sharp



Leaves slightly lobed

Twigs dull

BLACK

SECTION IV

Broad-leaved Plants with Alternate Compound Leaves

RELATIVELY few plants have compound leaves. Those with opposite leaves were presented in Section II (Plates 7–11, pp. 56–65). The rest are in this Section. In winter, the alternate leaf scars may sometimes indicate by their large size the former presence of compound leaves. Where there is doubt, however, the twigs of a leafless unknown plant with alternate leaf scars will have to be compared with the drawings of *both* Sections IV and V or identified by means of the Winter Key in Appendix B. **Warning:** Poison-ivy (Plate 25) and Poison Sumac (Plate 26) are in this group. Do not handle them. Be careful of unknown plants of this type.

Name *Plate*

1. Plants prickly or thorny:
   2. Arching brambles or climbing vines **BLACKBERRIES, ROSES, etc.** 23
   2. Erect plants:
      3. Leaf scars narrow, half-encircling twigs **ROSES** 23
      3. Leaf scars otherwise **LOCUSTS, etc.** 24
1. Plants without prickles or thorns:
   4. Leaves only once-compound:
      5. Vines **MISCELLANEOUS** 25, 30
      5. Erect trees and shrubs:
         6. Leaf scars narrow, half encircling twigs **ROSES** 23
         6. Leaf scars otherwise:
            7. Leaflets 3 **POISON-IVY, etc.** 25
            7. Leaflets more than 3:
      8. Leaflets toothed (though in Tree-of-Heaven with only 1 basal pair of glandular teeth):
         9. Leaflets mostly 11–14 (rarely 7 or 9):
            10. Buds nearly hidden beneath the leafstalk bases; sap often milky; mostly shrubs **SUMACS** 26
            10. Buds easily visible (somewhat hidden in Tree-of-Heaven); trees, shrubs, or vines:
               11. Buds white-woolly, brown-woolly, or red-gummy **WALNUTS, etc.** 27
               11. Buds yellow-hairy or brown-hairless **PECAN, WATER HICKORY** 28

	Name	*Plate*
9. Leaflets 5–9:		
12. Leaflets mostly 5–7:		
13. Wood not yellow	**HICKORIES (1)**	**28**
13. Wood bright yellow	**YELLOWROOT**	**31**
12. Leaflets mostly 7–9	**HICKORIES (2)**	**29**
8. Leaflets not toothed:		
14. Bundle scars more than 5	**SUMACS**	**26**
14. Bundle scars 1 to 5	**MISCELLANEOUS**	**30**
4. Leaves twice- or thrice-compound (leaf*lets* as well as leaves compound)	**COFFEE-TREE, etc.**	**31**

Prickly Brambles

(*Plate 23, p. 150*)

The raspberries, dewberries, and blackberries (all in the genus *Rubus*), and the roses are the only compound-leaved, rambling or arching, mostly nonclimbing, usually prickly or bristly shrubs in our area. The woody species of *Rubus* are all normally prickly except the flowering raspberries, which have simple leaves (Plate 42). A few roses are without prickles or may climb by means of twining stems. The twigs of brambles usually are green or red and both the stems and leafstalks are prickly. Except for the nearly flat-on-the-ground dewberries, they mostly grow in vaselike clumps with the stems arching back toward the ground. The only other plants at all likely to be confused with the brambles are the prickly greenbriers (Plate 33), which are simple-leaved green-stemmed vines climbing or scrambling over neighboring plants by means of tendrils.

In plants of the genus *Rubus*, new canes (stems) normally are produced each year. Each lives a year and a half or so, generally flowering and fruiting in the second season. The roots live on from year to year. The stems of roses are perennial, like most woody plants.

The leaves of all groups are toothed and divided into 3 or more leaflets. Where there are more than 3 leaflets, their arrangement differs by groups and species. In the Red Raspberry and the roses, the leaflets are feather-compound, that is, placed at right angles to the central leafstalk. In the Black Raspberry, dewberries, and blackberries, the leaflets are arranged like the spokes of a wheel. Winglike stipules are attached to the bases of the leafstalks in the roses and the leaf scars are narrow, half encircling the twigs. Stipules are absent and the leafstalk bases remain attached to the stems all winter in the other brambles. Raspberry fruits differ from those of dewberries and blackberries in that when ripe they separate from the fleshy stalks upon which they are borne, forming hollow shells. Rose fruits are seed-filled organs called "hips."

Both the genera *Rubus* (blackberries and relatives) and *Rosa* (roses) are extremely complex. Many specimens are encountered representing numerous varieties and hybrids that are puzzling even to professional botanists. Even disregarding the multitude of minor forms, there are over 200 species of *Rubus* and 23 species of *Rosa* listed for our region by Fernald.[*] Because of the difficulty of identifying the various species (and not all botanists agree there are so many), only representatives of the outstanding groups are illustrated and discussed here.

Several subgroups can be separated easily:

Stems round, usually *white-powdered*, arching; leafstalk bases not winged	**RASPBERRIES**
Stems round or angular, not white-powdered, *trailing;* leafstalk bases not winged	**DEWBERRIES**
Stems *angular*, not white-powdered, arching; leafstalk bases not winged	**BLACKBERRIES**
Stems round, not white-powdered, mostly arching; *leafstalk bases winged*	**ROSES**

All brambles are of value in soil-erosion control and wildlife management. They grow even on barren soils and reproduce by seeds, often dropped by animals, and in many *Rubus* species by rooting branches. These plants provide cover for wildlife and have been recorded as being eaten by over 150 birds and mammals (including nearly all the game birds and big-game animals on the continent). Rabbits, skunks, opossums, foxes, beavers, porcupines, and chipmunks are among other eastern mammals eating twigs or fruits. Raspberry, dewberry, and blackberry fruits are made into jam and desserts, leaves of some species occasionally are dried as tea, and peeled young sprouts are eaten raw in some localities. The petals of rose flowers have been candied as a confection and also have been eaten in salads. Rose fruits can be used in making jelly.

RED RASPBERRY *Rubus idaeus* L. **p. 150**

Recognition: An *arching* shrub with *round, bristly* stems, somewhat white-powdered when young. Canes do not root at tips. In a few localities either without bristles or with strong prickles. Leaves may consist of 3–7 elliptic leaflets, but on older fruiting canes 3 are usual. When 5- to 7-parted the leaves are *feather-compound.* Leaflets *whitened* beneath; side ones without stalks. Number of varieties and forms are recognized. Leaves 3″–10″. Height to 6′. Flowers white, May–July. Fruits *red*, June–Oct.

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[*] Merritt Lyndon Fernald, *Gray's Manual of Botany*, 8th ed. (New York: American Book Co., 1950).

Similar species: There are only 3 perennial raspberries in our area. (1) Canes of Wine Raspberry root at tips and are covered with long gland-tipped reddish hairs. (2) Black Raspberry has strong hooked prickles.

WINE RASPBERRY *Rubus phoenicolasius* Maxim. **Not illus.**
Recognition: Similar to preceding species but end leaflet somewhat *heart-shaped. Canes root at tips* and are covered by long gland-tipped reddish hairs. Introduced from e. Asia. Thickets; Massachusetts and Indiana to Virginia and Kentucky.

BLACK RASPBERRY *Rubus occidentalis* L. **p. 150**
Recognition: Differs from Red Raspberry in having *strong hooked prickles.* Canes longer (to 12′), more strongly whitened, and may root at tips. Leaves 5-parted, *fan-compound.* Leaves 2″–8″. Height to 6′. Flowers white, April–July. Fruits *black,* June–Aug.

BRISTLY DEWBERRY *Rubus hispidus* L. **p. 150**
Recognition: A *trailing* shrub with densely glandular-*bristly round stems.* Leaves shiny, leathery, often evergreen, with 3, less commonly 5, *fan-compound,* blunt-toothed leaflets. Leaves 3″–7″. Height to 12″. Flowers white, June–Sept. Fruits black, Aug.–Oct.
Similar species: Dewberries are divided primarily into 2 groups: those bristly and those prickly. Fernald lists 24 species of bristly dewberries for our area. Some blackberries are bristly but are relatively upright.

PRICKLY DEWBERRY *Rubus flagellaris* Willd. **p. 150**
Recognition: A *flattened* shrub with stems mostly round and with scattered but *stout curved prickles.* Leaves dull, thin, light green, sometimes slightly hairy with 3–5 sharp-toothed leaflets. Leaves 5-parted, *fan-compound.* Leaves 2″–7″. Height to 12″. Flowers white, May–June. Fruits black, June–Aug.
Similar species: Fernald lists 44 species of prickly dewberries.

BLACKBERRY *Rubus allegheniensis* Porter **p. 150**
Recognition: An upright or *arching* shrub; stems strongly *angular,* with *stout prickles.* Leaves have 3–7, mostly 5, leaflets, woolly or velvety beneath, at least when young; when 5- to 7-parted, the leaves are *fan-compound.* Young stems and left undersides glandular-hairy. Var. *gravesii* Fern. (w. Maine and ne. New York to Maryland) may be thornless, with round stems. Leaves 3″–8″. Height to 10′. Flowers white, May–July. Fruits black, July–Sept.
Similar species: Blackberries are the most complex category of

the genus. Fernald records 122 species. They are grouped as: (1) plants rooting at stem tips, (2) stems bristly rather than prickly, (3) stems gray-woolly when young and leaves white- or gray-woolly on undersides, (4) young stems not gray-hairy but glandular-hairy, (5) young stems otherwise hairy, and (6) stems hairless with prickles few or even absent. This species is a well-marked one of the 4th group.

ROSES *Rosa* spp. **p. 150**
Recognition: Some of the characteristics of roses have been listed above. Briefly, roses are usually *prickly or bristly arching* shrubs with 3–11 leaflets per leaf, varying with the species. Leaves 5- to 11-parted and *feather-compound.* They have long *leafy stipules* attached to lower portions of leafstalks. These leafstalk "wings" may vary. In some species they are partially free of the leafstalk; in others they may be either thick, thin, wide, narrow, hairy, toothed, or comblike. Leaf scars are *narrow, half encircling the twigs,* and contain 3 bundle scars. Twigs and stems mostly are green or red. Rose fruits, known as "hips," are fleshy, covering numerous small seeds. They usually are red and remain on the plants all winter. They are eaten by many wild animals, but mostly incidentally or where preferred foods are lacking.

A few imported escaped species and the Prairie Rose (*R. setigera* Michx.), the latter distinctive with only 3 leaflets among these, may climb by twining stems. The Multiflora Rose (*R. multiflora* Thunb.), now being planted widely for erosion control and wildlife benefits, can be distinguished from other roses with 7–9 leaflets by fringed or comblike stipules extending about half the length of leafstalks.

Erect Thorny Trees and Shrubs

(*Plate 24, p. 152*)

With the brambles, the following few species are the only thorny or prickly woody plants with compound leaves (whether alternate or opposite). The only other upright thorny plants are those with simple leaves on Plates 37–40. The locusts and Trifoliate Orange have smooth-edged or fine-toothed leaflets whose leafstalks never bear thorns; the other plants of this group have more coarsely toothed leaflets and often thorny leafstalks.

HONEY LOCUST *Gleditsia triacanthos* L. **pp.** *12*, **152**
Recognition: A tall tree with *feather-compound* or *twice-compound* leaves. Bark dark, somewhat scaly, adorned with numerous stout *branched thorns,* each *several inches* long. Leaves

divided into numerous narrow leaflets, which may be slightly toothed. These leaflets, in turn, frequently are subdivided. Hairless buds, hidden by the leafstalk bases in summer, are surrounded by leaf scars when twigs are leafless and may be supplemented by smaller buds located just above them. End buds false. Twigs stout; bundle scars 3. Leaves 6″–15″. Height 70′–80′ (140′); diameter 2′–3′ (6′). Flowers small, greenish, clustered May–July. Fruits *8″–18″ long*, flattened twisted pods with sweet pulp between numerous oval seeds, Sept.–Feb.

Similar species: (1) Only Water Locust also has such long thorns. (2) Black Locust has small paired thorns.

Remarks: Honey Locust, believed originally to have been restricted to Mississippi Valley, is now common eastward. The thorns have been used by woodsmen for pins, spear points, and animal traps. Heavy, durable wood used for railroad ties, fence posts, and agricultural implements. The tree does not harbor root bacteria capable of fixing nitrogen as do most legumes. Fruits eaten by cattle, deer, rabbits, squirrels, and bobwhite. A thornless variety is sometimes cultivated.

WATER LOCUST **Thorn illus., p. 152**
Gleditsia aquatica Marsh.

Recognition: Similar to Honey Locust but smaller, with leaflets somewhat wider, thorns of branches mostly *unbranched* and fruit pods *only 2″ long*, pulpless, containing only 1–3 seeds. Coastal Plain swamps; e. N. Carolina to centr. Florida, west to e. Texas, and north in the Mississippi Valley to sw. Indiana, s. Illinois, and se. Missouri.

BLACK LOCUST *Robinia pseudo-acacia* L. **pp.** *12*, **152**

Recognition: A medium-sized tree with *once-compound* leaves. Leaflets 6–20, egg-shaped. Strong ½″–1″ *paired thorns* flank nearly circular leaf scars. White-hairy buds burst through leaf scars upon enlargement. Twigs moderately stout, hairless; bundle scars 3. End buds false. Bark on old trunks dark, deeply ridged, and crosshatched. Leaves 6″–12″. Height 70′–80′ (100′); diameter 2′–3′ (6′). Flowers medium-sized, white, clustered, fragrant, May–June. Fruits 2″–6″ long, flat pods, Sept.–April.

Similar species: Other *Robinia* locusts have bristly, glandular or hairy twigs. (1) Prickly-ash is smaller and has reddish exposed buds, toothed leaflets, and usually thorny leafstalks. (2) Honey Locust has large branched unpaired thorns.

Remarks: Black Locusts often planted for fence posts. Wood strong, hard, and durable in the soil. Young shoots and bark sometimes poisonous to livestock but seeds eaten by bobwhite, pheasant, mourning dove, cottontail rabbit, snowshoe hare, and deer.

CLAMMY LOCUST *Robinia viscosa* Vent. **Twig illus., p. 152**
Recognition: A shrub or small tree; leaves similar to Black Locust. Thorns paired, *weak*, usually not over ¼″; twigs covered with *sticky glands*. Bark smooth, light brown, marked with short horizontal streaks. Leaves 6″–12″. Height 5′–20′ (40′); diameter 1″–3″ (6″). Flowers pink, not fragrant, May. Fruits sticky pods, 2″–3″, Aug.–Sept. Mountain woods; Pennsylvania and W. Virginia to Georgia and Alabama; occasionally escaped from cultivation northward to Nova Scotia and Quebec.

BRISTLY LOCUST *Robinia hispida* L. **Twig illus., p. 152**
Recognition: Similar to Clammy Locust but shrubby and twigs covered with *bristly hairs* almost as long as the paired thorns. Leaflets bristle-tipped; buds visible in winter. Height 2′–10′. Flowers rose-colored (often called Rose-acacia), not fragrant, May–June. Fruits bristly, Sept. Mountains from Virginia and Tennessee to Georgia and Alabama; escaped from cultivation northward to Connecticut.

DOWNY LOCUST **Not illus.**
Robinia elliottii (Chapm.) Ashe
Recognition: Similar to Black Locust but a low shrub with gray-hairy twigs, small thorns, and 5–7 leaflets that are somewhat hairy beneath. Height to 6′. Flowers purplish, May. Fruits hairy. Thickets and woods; N. Carolina and Georgia; escaped from cultivation in ne. Maryland.

HERCULES-CLUB *Aralia spinosa* L. **p. 152**
Recognition: *A very spiny* shrub or small tree with *very large twice- or even thrice-compound* leaves. Trunk and twigs stout, with numerous coarse prickles. Leaflets toothed, pointed; leafstalks thorny. Long, narrow leaf scars have about 20 bundle scars. End buds may be false. Leaves 2′–4′. Height 5′–15′ (35′); diameter 1″–4″ (9″). Flowers white, in flat-topped clusters, July–Sept. Fruits black, fleshy, 1-seeded, Aug.–Nov.
Similar species: Prickly stout stems and V-shaped leaf scars with numerous bundle scars are distinctive at all seasons. (1) Bristly Sarsaparilla is smaller, bristly rather than prickly. (2) Devil's-club (p. 197) has simple leaves and northwestern range.

BRISTLY SARSAPARILLA **Twig illus., p. 152**
Aralia hispida Vent.
Recognition: Similar to Hercules-club but smaller and woody only at stem base, with once- or twice-compound leaves. Twigs and leafstalks bristly-hairy. Leaves 4″–12″. Height 6″–36″. Flowers June–Aug. Fruits blue-black, Aug.–Sept. Poor soils;

Newfoundland, s. Labrador, and Manitoba to w. N. Carolina, West Virginia, Illinois, and Minnesota.

NORTHERN PRICKLY-ASH p. 152

Xanthoxylum americanum Mill.

Recognition: A shrub, often thicket-forming, with *paired prickles* flanking leaf scars and buds. Leaves once-compound with 5–11 toothed egg-shaped leaflets and often *prickly* leafstalks. Foliage has lemonlike odor when crushed and is hairy when young. Buds red-hairy, located above leaf scars. Bundle scars 3. True end buds present. Specimens without prickles are encountered rarely. Leaves 3″–10″. Height 4′–10′ (25′). Flowers small, greenish, clustered, April–May. Fruits small, dry, reddish-brown, 1- to 2-seeded pods, Aug.–Oct.

Similar species: (1) Black Locust grows to tree size, has hidden buds, leaflets not toothed, leafstalks not prickly. (2) See Southern Prickly-ash.

Remarks: Chewing leaves, fruits, or bark was once popular as a toothache cure. Known as Toothache-tree in some places.

SOUTHERN PRICKLY-ASH Leaflet illus., p. 152

Xanthoxylum clava-herculis L.

Recognition: This southern shrub or tree is larger than the northern species. Has a peculiar smooth gray trunk bark decorated with scattered *large corky knobs,* often prickle-tipped. Leaflets hairless, shiny, somewhat curved and unsymmetrical. Leaves 8″–16″. Height 10′–20′ (50′); diameter 4″–8″ (18″). Poor Coastal Plain soils; se. Virginia to s. Florida and west to e. Texas, north in Mississippi Valley to s. Arkansas and se. Oklahoma.

TRIFOLIATE ORANGE Not illus.

Poncirus trifoliata (L.) Raf.

Recognition: An imported shrub often planted as a hedge in South. Easily identified by stiff green stems that bear many stout green thorns. Buds bright red, ball-like; end buds false; leaf scars very small, with 1 scarcely visible bundle scar. Leaves divided into 3 small wavy-edged leaflets. Leafstalks "winged." Small citrus fruits are bitter. Height rarely to 20′. Flowers white, April–May. Fruits Sept.–Oct. Thickets; e. Virginia to Florida and Texas.

Thornless Trifoliates

(Plate 25, p. 154)

Relatively few plants bear 3-parted compound leaves. Several opposite-leaved species and the prickly brambles are in this category. In addition, a blackberry (*Rubus canadensis* L.) and a rose (*Rosa blanda* Ait.) may lack prickles and also bear 3-parted leaves. They more closely resemble the species drawn on Plate 23 than they do these thornless trifoliates. The following thornless plants are those outside the genera *Rubus* and *Rosa* which have alternate trifoliate leaves. See also Boston Ivy (p. 188).

POISON-IVY *Rhus radicans* L. **p. 154**

Recognition: DANGER: DO NOT TOUCH THIS PLANT. All parts contain a dangerous skin irritant. Grows as *an erect shrub, trailing vine, or climber.* Leaves *3-parted* and long-stalked but otherwise variable. They may be stiff and leathery or merely thin, somewhat hairy beneath or not, shiny or dull, coarse-toothed and wavy-edged, or neither. Poison-ivy leaves may be somewhat reddish but this occurs only in young or in dying leaves. End leaflet has *longer stalk* than side ones and has pointed tip. Twigs are brown and, if climbing, have many short aerial rootlets. Old stems of climbing vines densely covered with dark fibers. Aerial rootlets and fibrous coverings lacking in upright specimens. Buds visible, hairy, without scales, pinched at base. Leaf scars large, with a half-dozen or so bundle scars. Upright plants usually are branches of underground stems and occur in thickets. Leaves 4″–14″. Height 2′–5′ (10′) when not climbing. Flowers small, yellowish, May–July. Fruits small, smooth, *white,* ball-shaped, clustered, Aug.–Nov. or longer.

Similar species: Poison-ivy and (1) Poison-oak (see next) are the only common thornless alternate-leaved woody plants with 3-parted leaves and visible buds. In winter, even upright form can be distinguished by numerous bundle scars and stalked hairy buds. Long stalks of end leaflets and white fruits are additional, though seasonal, field marks. Poison-ivy is the only alternate-leaved vine climbing by aerial rootlets and the only one with fiber-hairy stems. Both (2) Fragrant Sumac and (3) Hoptree have hidden buds and short-stalked end leaflets; (4) Cissus (p. 132) and (5) Boston Ivy (p. 188) climb by tendrils. (6) "Five-leaved Poison-ivy" is an unsuitable name sometimes used for the pretty and harmless Virginia Creeper. (7) See also Ashleaf Maple (p. 52).

Remarks: All parts of the plant contain a heavy nonvolatile oil that causes inflammation of the skin, with blisters and swelling, in susceptible persons. Individuals vary in reaction but the skin must come in direct contact with the dangerous oil or with the smoke from burning Poison-ivy in order to be irritated. *Anyone who learns to recognize the plant and avoids it and anything that comes in contact with it will not be affected.* The old saying "leaflets three, let it be" provides adequate warning when the plant is in leaf.

Contact with the plant usually results in itching and other symptoms within a few hours. Washing the exposed parts of the body with a thick lather of yellow laundry soap is of value soon after exposure. Water alone, unless in large amounts, may only serve to spread the oil. Mild irritations may be treated with mild astringent lotions but cases of ivy poisoning involving the eyes or genitals and widespread irritations of other parts of the body should be treated promptly by a physician. The merits of taking injections for the prevention of ivy poisoning is a matter for medical opinion.

Despite poisonous effects of the plant on humans, the fruits are relished by over 60 species of birds, including the bobwhite, pheasant, prairie chicken, ruffed and sharptail grouse. Many seeds are passed undamaged through their digestive systems and distribution of Poison-ivy is thus aided.

POISON-OAK *Rhus toxicodendron* L. **Not illus.**

Recognition: DANGER: A southern species generally similar to Poison-ivy but *always erect.* Leaflets varied, *blunt-tipped,* obviously *hairy on both sides.* They may be lobed somewhat like oak leaves. Fruits usually hairy. Some authorities believe differences between the several forms of Poison-oak and Poison-ivy are inconsequential and that all probably should be grouped under one name. The irritating effects of Poison-oak are similar to those of Poison-ivy. Height to 10′. Flowers May–June. Fruits Aug.–Nov. or longer. Sandy and gravelly soils of Coastal Plain, New Jersey, and Maryland to Florida and e. Texas, and s. Missouri, e. Oklahoma, and Tennessee to Texas.

FRAGRANT SUMAC *Rhus aromatica* Ait. **p. 154**

Recognition: A low bush or rambling shrub with *3-parted* large-toothed leaves that have a pleasant odor when crushed. End leaflet *short-stalked.* Twigs brown, bark smooth; aerial rootlets and fibrous coverings not present. Leaf buds hidden beneath round leaf scars; end buds false. Bundle scars numerous. Flower buds clustered in dense spikes, present at twig tips from late summer to spring. Leaves 4″–6″. Height to 7′. Flowers small, greenish, April–July. Fruits *small, hairy, red,* ball-shaped, clustered, May–July.

Similar species: Aromatic leaves, hidden buds, circular leaf scars, and winter flower spikes are distinctive at all seasons.

Remarks: Fruits eaten by ruffed grouse and wild turkey. Twigs browsed by whitetail deer.

CISSUS *Cissus incisa* (Nutt.) Des Moulins **Not illus.**
Recognition: A stout, sometimes evergreen climbing vine with deeply 3-lobed or 3-parted thick leaves. *Tendrils* (see grapes, Plate 34) that do not have disks at the tips, occur opposite most leaf scars. Even when bearing 3-lobed leaves, it is distinct from the true grapes in that the bark is tight rather than shreddy and the pith is white, not brown. Poison-ivy climbs by aerial rootlets. Found primarily in sandy and rocky areas; se. Kansas and Missouri to Texas and Florida.

HOPTREE *Ptelea trifoliata* L. **p. 154**
Recognition: An upright shrub or small tree with *3-parted leaves* that usually are hairless but may be hairy beneath. Leaflets usually without teeth, end leaflet *short-stalked.* Twigs brownish and round; buds hairy and hidden in summer by leafstalk; leaf scars U-shaped; bundle scars 3. End buds false. Trunk bark rather smooth, light colored, shallowly grooved. Var. *mollis* T. & G., occurring only on Lake Michigan sand dunes, has velvety twigs and leaves. Leaves 4″–10″. Height 10′–20′ (25′); diameter 2″–10″ (16″). Flowers greenish, small, clustered, May–July. Fruits flat, circular, papery, 2-seeded, Sept.–spring.
Similar species: (1) Often mistaken for Poison-ivy (p. 130). (2) See Fragrant Sumac (p. 131).

SCOTCH BROOM *Cytisus scoparius* (L.) Link **p. 154**
Recognition: A dense *stiff-branched,* hairless, *evergreen* shrub. Leaves small, some not divided, but trifoliate compound leaves most abundant. Twigs slender, *angular,* grooved, greenish, often withered at tips. Leaf scars round; bundle scars single. Buds small but visible, flanked by slender stipules. Leaves ½″–1″. Height to 10′. Flowers large, yellow, May–June. Fruits pods, ¾″–1½″ long, July–Sept.
Similar species: Small leaves and green ridged twigs of this European importation are unique among thornless woody trifoliates except for (1) Bicolor Lespedeza, which is less bushy, not evergreen, and has smaller fruits. (2) Matrimony-vines (Plate 37) usually thorny and twigs not green. (3) Shrubby Cinquefoil (Plate 30) lower and has 5-parted leaves. (4) See also Gorse (Plate 6).

BICOLOR LESPEDEZA *Lespedeza bicolor* Turcz. **Not illus.**
Recognition: In many places this slender and weak shrub is planted as food for the bobwhite quail. Although not reported as spreading, it may be encountered under conditions appearing to be wild. Usually grows in patches or stands.

Leaves shaped like those of Scotch Broom but all leaves are 3-parted. Leaflets blunt-tipped, with midrib usually extending *slightly beyond leaflet tip.* Twigs very slender, brownish or greenish, with 8–12 fine lines and grooves running lengthwise. Buds very small, flanked by slender stipules. Weak stems mostly end in upright cluster of purplish flowers or small dry fruit pods ⅛″–¼″. Leaves 1″–3″. Height 4′–6′ (10′). Fields; north to New York, Michigan, and Minnesota.

Sumacs

(*Plate 26, p. 156*)

Strictly speaking, the sumacs as a genus (*Rhus*) also include Poison-ivy, Poison-oak, and Fragrant Sumac (Plate 25). The sumacs considered on this plate, however, are distinctive in having more than 3 leaflets per feather-compound leaf, in being upright shrubs, and in having stout, more pithy twigs. Leaflets occur in opposing pairs except for end one. Side buds are mostly hidden by bases of the leafstalks and end buds are false. Bundle scars are numerous. Milky sap occurs in all on this plate except Poison Sumac. The flowers are small, greenish, and clustered. The fruits of Poison Sumac are greenish white like those of Poison-ivy. The other species bear dense spikes of small, dry, red, hairy fruits, which usually remain on the plants all winter and provide an apparently little-relished but available food supply for wildlife.

A number of plants of Plates 26–30 are similar in being upright and nonthorny with alternate once-compound leaves of more than 3 leaflets. Of these, the Tree-of-Heaven, Yellowwood, indigo-bushes, and Western Soapberry are the only ones with false end buds. The hairy twigs, toothed leaflets, hidden buds, and milky sap will separate three of these sumacs from those plants. To distinguish the Poison Sumac, see under that species.

WINGED SUMAC *Rhus copallina* L. **p. 156**

Recognition: A shrub or, in South, rarely a small tree. Leaves large, divided into 11–23 narrow, *smooth-edged shiny* leaflets, midrib bordered by *thin "wings."* Twigs and leafstalks *velvety,* round, and marked with obviously raised dots. Buds hairy, surrounded by U-shaped leaf scars. Trunk is dark and smooth, with numerous raised cross streaks (lenticels). Leaves 6″–14″. Height 4′–10′ (30′); diameter 1″–3″ (10″). Flowers July–Sept. Fruits red, short-hairy.

Similar species: Winged midribs and dotted twigs distinctive.

Remarks: Twigs are cropped by deer.

STAGHORN SUMAC *Rhus typhina* L. **pp.** *12*, **156**

Recognition: A shrub or small tree with *very hairy* twigs and leafstalks. Leaves large, made up of 11–31 *toothed* leaflets. Twigs round, no obvious dots. Buds hairy, surrounded by U-shaped leaf scars. Bark dark and smooth, with numerous raised cross streaks. Leaves 12″–24″. Height 4′–15′ (50′); diameter 2″–4″ (15″). Flowers June–July. Fruits red, long-hairy.

Similar species: (1) Lack of winged midribs and twig dots separates this from Winged Sumac. (2) Hybridization with Smooth Sumac sometimes occurs, and intermediate characteristics result.

Remarks: Aptly named, this shrub's branches bear a marked resemblance to the antlers of a deer "in velvet." It is cultivated in Europe. Bark and leaves rich in tannin; it is reported that a black ink can be made by boiling leaves and fruit. The long-haired fruits have been found in stomachs of many songbirds, ruffed and sharptail grouse, bobwhite, pheasant, mourning dove, and skunk. Twigs cropped by moose, whitetail deer, and cottontail rabbit.

POISON SUMAC *Rhus vernix* L. **p. 156**

Recognition: DANGER: DO NOT TOUCH ANY PART OF THIS PLANT. All parts contain a dangerous skin irritant. Shrub or small tree with large leaves composed of 7–13 pointed leaflets *not toothed.* Twigs and buds round, *hairless;* leaf scars crescent- or shield-shaped, do not surround buds. Bark smooth and dark with numerous narrow cross streaks often tending to encircle trunk. Leaves 6″–12″. Height 6′–20′ (30′); diameter 3″–8″ (10″). Flowers May–July. Fruits *white,* Aug.–spring.

Similar species: Over most of our area the only shrub with *hairless* buds and twigs and *once-compound* leaves that are *not toothed.* Its *swampy* habitat is a clue. Most similar are (1) Yellowwood (Plate 30), with blunt-tipped leaflets, and (2) Western Soapberry (p. 145), with greater height and only 3 bundle scars.

Remarks: Though more virulent than Poison-ivy, this species is generally uncommon; largely confined to swamps. Few people are likely to come in contact with it. Medical symptoms and treatment similar to those for Poison-ivy (see p. 130). Poison-ivy (with Poison-oak) and Poison Sumac are the only plants in our area that for most people are dangerous to touch. Names in common use, such as Poison-elder or Poison-dogwood, usually refer to Poison Sumac. Fruits eaten by numerous birds, including bobwhite, pheasant, and ruffed grouse. Twigs browsed by cottontail rabbit. Foliage may turn yellow or red in autumn.

SMOOTH SUMAC *Rhus glabra* L. **p. 156**
Recognition: Similar to Staghorn Sumac, but with twigs and leafstalks *hairless.* Twigs somewhat flat-sided. A variety with short-hairy twigs is believed to be a hybrid between this and Staghorn Sumac. Fruits red, short-hairy.

Walnuts and Similar Trees

(*Plate 27, p. 158*)

These are trees with alternate feather-compound leaves. The leaflets are numerous and toothed, although the Tree-of-Heaven often has only 1 pair of gland-bearing teeth at the bases of the leaflets. They are best distinguished from the sumacs and hickories as indicated later.

BLACK WALNUT *Juglans nigra* L. **pp. 8, 158**
Recognition: A tall tree whose large leaves have 7–17 narrow, toothed leaflets slightly hairy beneath. Often end leaflet is *lacking.* Crushed leaves are spicy-scented. Twigs hairless, stout, pith light brown and chambered by woody partitions (pith of branchlets usually better developed than that of twigs). Buds *whitish woolly;* leaf scars large, *without hairy fringe;* bundle scars in 3 groups. True end buds present. Bark dark and deeply grooved; ridges not shiny. Leaves 12″–24″. Height 70′–100′ (150′); diameter 2′–4′ (6′). Flowers catkins, April–June. Fruits *large spherical nuts* with husks of 1 piece, Oct.–Nov.
Similar species: Black Walnut and Butternut only plants with compound leaves that have chambered piths. Butternut has hairy ridge above leaf scar, darker pith, end leaflet present, bark shiny-ridged.
Remarks: One of the most valuable and beautiful native trees. Heavy, strong, durable heartwood easily worked, in great demand for veneers, cabinetmaking, interior finishing, and gunstocks. Bark is used in tanning; yellow-brown dye can be made from nut husks. Nuts eaten by humans, squirrels, and mice; twigs by deer. Large trees have been almost exterminated in some regions. The bruised nut husks once were used to kill fish for food but this is now illegal. Tomatoes, apples, and other species may not survive near large walnut trees.

BUTTERNUT *Juglans cinerea* L. **pp. 8, 158**
Recognition: Similar to Black Walnut but with prominent *hairy fringe* above leaf scar. Pith dark brown; end leaflet normally present. The wider bark ridges are smooth-topped,

making a *shiny*, interlaced gray network superimposed upon the black fissures. Number of leaflets varies between 7 and 17. Twigs and leafstalk bases somewhat hairy. Height 40′–80′ (100′); diameter 1′–2′ (3′). Fruits are somewhat *oblong and sticky;* nuts with 1-piece husks, Oct.–Nov.

Remarks: Also known as White Walnut, wood lighter in color than that of its more valuable relative. Lumber is light, soft, and weak, but easily worked and polished; darkens upon exposure to air. Though not an important timber species, used for interiors, cabinetwork, furniture, and instrument cases. The early colonists are reported to have prepared a yellow-brown stain by boiling the soft, half-ripe fruits. They also pickled the boiled nuts and made a dark stain from the husks and inner bark to dye uniforms. Indians are said to have boiled the nuts to obtain oil that came to top for use as butter. The nutmeats then were collected and dried. In spring, sap was boiled down to make syrup. The crushed fruits also were once used to poison fish. Bark yields useful drugs and nuts are eaten by many wild animals.

TREE-OF-HEAVEN (AILANTHUS) pp. *12*, 158

Ailanthus altissima (Mill.) Swingle

Recognition: A fast-growing small to large tree with very large leaves having 11–41 leaflets. Leaflets *not toothed* except for pair of *gland-tipped teeth near bases.* Twigs hairless, yellow-brown, stout, with continuous yellowish pith. Buds small, brown-woolly; end buds false. Leaf scars *very large,* somewhat triangular, with numerous bundle scars. Bark gray-brown, smooth, or with narrow light-colored grooves. Leaves 12″–24″ or more. Height 80′–100′; diameter 1′–2′. Flowers small, yellowish, clustered, male blossoms with foul odor, June–July. Fruits dry, narrow, 1-seeded, winged, Sept.–winter.

Similar species: No other tree has such gland-tipped leaflet lobes. In winter, stout twigs, false end buds, large leaf scars, and numerous bundle scars are distinctive. The Coffee-tree (Plate 31) has large leaf scars but fewer bundle scars. It has twice-compound leaves and salmon-colored pith.

Remarks: An oriental species; has become a weed here. Imported by way of England, where first planted in 1751. Most rapid growing woody plant in our area. Will thrive under extremely adverse conditions, growing as much as 8′ in a year. Annual sprouts 12′ long not uncommon where a tree has been cut down. Since it is adapted to disturbed sites, even a crack between bricks in an alleyway may provide a seedbed for this plant. Immune to dust and smoke and may grow to a large size. Though soft, wood has some lumber and fuel values. The common name is supposed to be of Asiatic or Australian origin, alluding to its height.

AMERICAN MOUNTAIN-ASH **p. 158**
Pyrus americana (Marsh.) DC.

Recognition: A shrub or small tree. Compound leaves have 11–17 long, narrow, toothed, *long-pointed* leaflets; leaflets over 3 times as long as broad. Leaves and twigs hairless. Buds *reddish, sticky, and hairless;* leaf scars narrow, with 5 bundle scars. End buds true. Spur branches may be present; bark rather smooth and gray-brown. Leaves 6″–9″. Height to 40′; diameter to 12″. Flowers small, about ¼″, clustered, May–June. Fruits *small, reddish, clustered, about* ¼″, Aug.–March.

Similar species: (1) Northern Mountain-ash has wider leaflets, flowers, and fruits. (2) European Mountain-ash has woolly buds.

Remarks: This member of the rose family is one of most ornamental northern trees. Fleshy red fruits often remain on tree late in winter and are eaten by many birds and mammals, including ruffed and sharptail grouse, ptarmigan, fisher, and marten. Deer and moose browse twigs.

NORTHERN MOUNTAIN-ASH **Leaflet illus., p. 158**
Pyrus decora (Sarg.) Hyland

Recognition: Like American Mountain-ash but leaflets *less than 3 times* as long as broad and somewhat whitened beneath. Flowers about ⅜″ across and *fruits over* 5/16″. Var. *groenlandica* (Schneid.) Fern. has long-pointed leaflets not whitened beneath; their wider portions are relatively wider than in American Mountain-ash. See also next species. Var. *groenlandica* is limited to area from s. Greenland and Labrador to mountains of Newfoundland, e. Quebec, and n. New England. Flowers June–July. Fruits Sept.–winter. Woods and rocky places; Greenland, Labrador, n. Ontario, and Minnesota to Maine, nw. Massachusetts, n. Ohio, n. Indiana, and Iowa.

EUROPEAN MOUNTAIN-ASH **Not illus.**
Pyrus aucuparia (L.) Gaertn.

Recognition: Widely cultivated and occasionally escapes. Resembles previous 2 species except that leaflets are smaller and somewhat hairy beneath; buds white-woolly and not sticky. Leaflets short-pointed as in American Mountain-ash; flowers and fruits more closely resemble Northern Mountain-ash. Local; Newfoundland, s. Canada, and se. Alaska to Maine, Pennsylvania, Iowa, and Washington.

Hickories (1) and (2)

(*Plates 28 and 29, pp. 160, 162*)

The hickories are trees with feather-compound leaves whose leaflets are toothed and mostly long-pointed. Twigs are stout, tough, and flexible, pith solid. Buds and leaf scars are large and conspicuous. True end buds are present; bundle scars numerous. The male flowers are in prominent catkins, occurring in spring. Husks of hickory nuts characteristically break into 4 rather separate parts upon ripening; those of walnuts and other similar nut-bearing species remain entire.

Most other nonthorny plants with alternate compound leaves have false end buds. Among those that resemble the hickories in having true end buds, Poison-ivy (Plate 25) has slender twigs and nonscaly buds, Black Walnut and Butternut (Plate 27) have chambered piths, and the mountain-ashes (Plate 27) and Yellowroot (Plate 31) have narrow leaf scars. In winter the hickories may be distinguished by the occurrence of true end buds, large leaf scars, and solid pith.

Fruits of several hickories, especially Pecan and Shagbark, are edible and have commercial value. They usually fall in September

Brief Guide to Identification of Hickories

Species	*Number of leaflets*	*Bud scales paired*	*End buds large*[*]	*Twigs hairy*	*Mature bark shaggy*	*Outer bud scales fall early*[†]	*Further notes*
Pecan	9–17	yes	no	no	no	no	buds yellow, hairy
Bitternut	5–11	yes	no	no	no	no	buds yellow, hairless
Water	9–17	yes	no	no	yes	yes	buds brown with yellow glands
Shagbark	5–7	no	yes	var.	yes	no	twigs red-brown
Shellbark	7–9	no	yes	no?	yes	no	twigs light tan
Mockernut	7–9	no	yes	yes	no	yes	
Pignut	5–7	no	no	no	no	yes	nut husks split partly
Sweet Pignut	5–7	no	no	no	var.	yes	nut husks split to base
Black	5–7	no	no	var.	no	yes	twigs, buds rusty-hairy
Pale	7–9	no	no	var.	no	yes	end buds to ¼″

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[*] End buds mostly over ½″ long. Associated characteristics: twigs stout and nut husks over ⅛″ thick.

[†] Such buds look quite smooth.

and October. Nuts of most species are eaten by domestic swine, squirrels, opossums, wild turkey, and occasionally by ducks. Twigs are browsed by rabbits and deer. Crushed green nut husks formerly were used to poison fish for food, but fortunately this is now illegal.

Hickory wood is strong, heavy, tough, and elastic but decays on contact with moisture and is subject to insect attacks. It is of value in the manufacture of skis, tool handles, agricultural implements, wagons, gunstocks, axletrees, chair backs, and baskets, and once was important as best American wood for barrel hoops. As fuel it is excellent, producing great heat and high-grade charcoal.

The hickories may be divided into 3 groups: *pecans,* with paired and usually yellow bud scales; *shagbarks,* with mature trunk bark that peels in strips, large end buds (over ½″ long), stout twigs (over ⅛″ diameter), and thick nut husks (over ⅛″); and *pignuts,* with tight bark, small end buds, slender twigs, and thin nut husks.

PECAN *Carya illinoensis* (Wang.) K. Koch **p. 160**

Recognition: A tall tree with 9–17 leaflets per leaf. Buds have 2–3 pairs of nonoverlapping *yellow-hairy* bud scales. Twigs hairless; bark closely ridged, *not peeling.* Nuts edible; considerably longer than wide. Husks *thin,* ridged along 4 joint lines. Bark medium dark, with numerous vertical ridges. Leaves 12″–20″. Height 100′–120′ (160′); diameter 3′–4′ (6′).

Similar species: Two other hickories have bud scales paired with edges meeting: (1) Water Hickory has brownish buds with yellowish glands that soon fall off; (2) Bitternut has permanently yellow hairless bud scales and 7–9 leaflets.

Remarks: About 100 varieties of this tallest hickory are cultivated in Southeast for their delicious nuts. Fruits of orchard trees have thinner husks than those of wild specimens. Although principally a southern species of river bottoms, it will grow on uplands as far north as Massachusetts (in sheltered places). Fruits rarely mature in North, where pecans are mostly planted for ornament. In South, opossum, wild turkey, and squirrels feed on nuts.

WATER HICKORY (BITTER PECAN) **p. 160**
Carya aquatica (Michx. f.) Nutt.

Recognition: Similar to Pecan but more southern and smaller. Buds *red-brown* with yellowish gland spots, which soon disappear; bark *shaggy.* Nuts bitter, egg- or *ball-shaped.* Husks wrinkled, not splitting to base. Leaves 8″–18″. Height 50′–70′ (100′); diameter 12″–24″ (30″).

SHAGBARK HICKORY **pp. 8, 160**
Carya ovata (Mill.) K. Koch

Recognition: A tall tree with leaves with 5–7 (usually 5) hairless leaflets. When present, dense tufts of hair on leaflet teeth (use lens) are field marks. Buds covered by many overlapping scales; end buds over ½″. Twigs *stout, red-brown,* slightly hairy to shiny. Bark light-colored, *very shaggy,* in long, loose strips. Nuts *egg-shaped,* 1⅜″–3″, edible, 4-angled, not ridged. Nut husk yellowish, thick, splitting to base. Var. *pubescens* Sarg. (sw. New Hampshire to Georgia and Mississippi) has hairy twigs and leaf undersides. Var. *nuttallii* Sarg. (Massachusetts and Pennsylvania to Missouri) has nuts less than ⅞″ long. Var. *fraxinifolia* Sarg. (w. New York, w. Ontario, and Iowa to Ohio and Oklahoma) has narrow, ashlike leaflets. Leaves 8″–14″; height 60′–90′ (120′); diameter 2′–3′ (4′).

Similar species: This is the only one of the shagbark group with so few leaflets; the 3 other hickories with 5–7 leaflets all have small end buds. (1) Shellbark Hickory has, and (2) Sweet Pignut may have, shaggy trunk bark; Shellbark has 7–9 leaflets, soft-hairy beneath, plus light tan or orange twigs; Sweet Pignut has small end buds and slender twigs. (3) Mockernut Hickory also has large end buds, but its 7–9 leaflets, tight trunk bark, early-falling outer bud scales, and its woolly twigs and foliage distinguish it.

PIGNUT HICKORY *Carya glabra* (Mill.) Sweet **pp.** 8, **160**

Recognition: A tall tree with leaves of 5 (less commonly 7) hairless leaflets. Buds have overlapping scales; end bud ⅜″–½″, silky-hairy after outer scales drop in autumn. Twigs *slender,* red-brown, and hairless. Bark dark, *tight* and smooth-ridged. Nuts egg-shaped, ⅝″–1⅜″, hard-shelled, sometimes sweet. Nut husks thin, brown, usually *not* splitting to the base. Var. *megacarpa* Sarg. has longer leaves and fruits, thicker nut husks. Leaves 6″–12″. Height 80′–90′ (120′); diameter 2′–3′ (4′).

Similar species: (1) Also with 5–7 leaflets, Shagbark has loose bark, large end buds and end leaflets; (2) Pale Hickory has end buds less than ¼″; (3) Sweet Pignut has leaflets somewhat yellowish beneath. Two others may have tight bark and overlapping bud scales: (4) Mockernut has large end buds, hairy twigs and leaflets; (5) Black Hickory has rusty-hairy twigs and leaves; both have 7–9 leaflets.

SWEET PIGNUT HICKORY **Fruit illus., p. 160**
Carya ovalis (Wang.) Sarg.

Recognition: Similar to Pignut Hickory and considered by some botanists as a variation of that species. Leaflets usually 7, less commonly 5; yellow-powdery beneath when young. Bark variously ridged, *scaly* or *shaggy.* Thin-husked fruits regularly split *to the base,* nuts always sweet. Twigs mostly hairless. Varieties with different characteristics of leaf undersides are known: hairy, *hirsuta* (Ashe) Sarg.; sticky, *odorata* (Marsh.) Sarg. Leaves

6″–12″. Height 50′–80′ (100′); diameter 2′–3′. Moist or dry woods; sw. New Hampshire, s. Ontario, Wisconsin, and Iowa to Georgia, Mississippi, and Arkansas.
Similar species: Looser bark, more readily splitting nut husks, and consistently sweet nuts distinguish this species in winter from Pignut Hickory.

BLACK HICKORY *Carya texana* Buckl. **Not illus.**
Recognition: Like Pignut Hickory, a large close-barked, small-budded tree with 5–7 leaflets. Unlike all other hickories, however, twigs, buds, and leaf undersides are *rusty-hairy.* Nut edible, ball- to egg-shaped, husk yellow-scaly and up to 3⁄16″ thick. Dry woods; s. Indiana, s. Illinois, Missouri and e. Kansas, to Louisiana, and s. Texas.

Hickories (2)

(*Plate 29, p. 162*)

These species have leaves mostly with 7–9 leaflets.

BITTERNUT HICKORY **p. 162**
Carya cordiformis (Wang.) K. Koch
Recognition: A medium-sized to tall tree. Leaflets 5–11, somewhat hairy beneath. Buds *bright yellow-powdery* with scales in *pairs,* not overlapping. End buds under ½″, sometimes more than 2 scales exposed. Twigs *slender,* mostly hairless. Bark *tight* with network of fine smooth ridges. Nuts cylindrical, smooth and bitter; husks *thin,* ridged toward outer end. Hybrids with Pecan and Shagbark Hickory sometimes occur. Leaves 6″–12″. Height 50′–60′ (100′); diameter 18″–24″ (36″).
Similar species: See Pecan (Plate 28).

PALE HICKORY **p. 162**
Carya pallida (Ashe) Eng. & Graebn.
Recognition: A tree with pale to dark gray, smooth to furrowed, sometimes shaggy bark. End buds *mostly* ¼″ or less. Leafstalks usually long-hairy. Twigs fine-hairy or not. Fruit husks thin, yellow-powdery, ridged, typically split to the base. Nuts sweet. Height 40′–50′; diameter 18″–20″.
Similar species: Very small end buds tend to be distinctive. See under Pignut Hickory (p. 140).

MOCKERNUT HICKORY *Carya tomentosa* Nutt. **p. 162**
Recognition: A medium-sized to tall tree with 7–9 leaflets; leaf undersides and twigs *matted-woolly.* Hairs curly and clustered. Leaves fragrant when crushed, pale or orange-brown beneath.

Buds have overlapping scales. End buds ⅝″–1″; *outer scales fall* in autumn. Twigs stout. Bark *tight* and deeply furrowed. Nuts ball- to egg-shaped, edible, with *thick husk* not splitting to base. Bark tight with network of smooth ridges. Leaves 8″–15″. Height 50′–80′ (100′); diameter 18″–24″ (36″).
Similar species: Three hickories have end buds over ½″. This the only one with tight bark, end buds dropping the outer scales in autumn, and with matted-woolly twigs and foliage.

SHELLBARK HICKORY **p. 162**
Carya laciniosa (Michx.) Loud.
Recognition: A tall tree. Leaflets 7–9, hairless or short-hairy beneath. Buds have overlapping scales; end buds ½″–1″, somewhat hairy, darker *outer scales present.* Twigs *stout, orange-brown, hairless* or slightly hairy. Bark *very shaggy,* loosening in *long strips.* Nuts egg-shaped, 1⅛″–2⅜″, edible, angled but not ridged. Husks thick, splitting to base. Leaves 15″–22″. Height 80′–100′ (120′); diameter 3′–4′.
Similar species: See Shagbark Hickory (Plate 28).

Miscellaneous Species with Alternate Once-compound Leaves

(*Plate 30, p. 164*)

Except for Poison-ivy (Plate 25), the Virginia creepers and wisterias are the only vines with leaves of this type. The other species discussed here are upright shrubs or trees. They (and some sumacs, Plate 26) are the only plants with alternate once-compound leaves that have more than 3 leaflets and no leaf teeth.

YELLOWWOOD *Cladrastis lutea* (Michx. f.) K. Koch **p. 164**
Recognition: A medium-sized tree with 7–11 *smooth-edged,* sometimes silky leaflets, 2″–4″ long, arranged alternately along midrib. Buds hairy, often several, one above the other, hidden beneath hollow leafstalk bases or, in winter, surrounded by U-shaped leaf scars. Twigs brownish, stout, end buds false; bundle scars 5. Bark smooth, gray; wood *yellow.* Leaves 5″–8″. Height to 60′; diameter to 3′. Flowers white, clustered, May–June. Fruits pealike pods, Sept.–Oct.
Similar species: Only other thornless species with alternate once-compound toothless leaves of more than 3 leaflets are: (1) Poison Sumac (Plate 26), which usually is shrubbier and has more or less visible buds; (2) Winged Sumac (Plate 26), with winged midribs and velvety twigs; and (3) Western Soapberry

(p. 145), with narrow leaflets, visible buds, and 3 bundle scars. (4) Yellowroot (Plate 31) has toothed leaflets, long narrow leaf scars. (5) In winter, Beech (Plate 57) has similar bark but has long slim hairless buds.

BLADDER-SENNA *Colutea arborescens* L. **Not illus.**
Recognition: Shrub with leaves of 9–13 elliptic, sometimes notch-tipped, leaflets, each ¾″–1¼″ long. Triangular stipules flank much raised leaf scars. Buds with 2–4 scales, often clustered; bundle scars 1 or 3. Leaves 2″–4″. Height to 12′. Flowers yellow, in leaf angles, June–Sept. Fruits papery, inflated, pods. Occasional escape from cultivation. See next.

SHRUBBY CINQUEFOIL *Potentilla fruticosa* L. **p. 164**
Recognition: A low shrub, sometimes somewhat flattened on ground on exposed northern sites. Small leaves have 5, less commonly 7, narrow, hairless to white-silky leaflets. Leaflets less than 1″ long, edges sometimes curled over. Bark *shreddy,* buds hairless and visible, leaf scars much raised and, with pointed stipules, somewhat clasp bases of buds. Bundle scars single. Leaves ½″–1½″. Height to 3′. Flowers yellow, up to 1⅛″ across, June–Oct. Fruits small, dry, hairy, in a head.
Similar species: This species and some indigobushes are the only low shrubs with small compound leaves. In summer the fewer leaflets identify this species. In winter shreddy bark and clasping leaf scars and stipules are distinctive. Scotch Broom (Plate 25) is taller, with 3-parted leaves, green ridged twigs.

DULL-LEAF INDIGOBUSH *Amorpha fruticosa* L. **p. 164**
Recognition: A variable, medium-sized shrub with numerous leaflets. Both leaves and leaflets have *obvious stalks;* leaflets thick, *dull-surfaced,* ¾″–1½″, blunt or sometimes somewhat pointed, hairless or fine gray- or brown-hairy, resin-dots visible through a lens. Twigs round or finely grooved, hairless or very fine-hairy. Buds hairless, visible, sometimes several above each other; end one false. Leaf scars somewhat raised; bundle scars 3; bark smooth. Leaves 3″–9″. Height to 13′. Flowers purplish spikes, May–June. Fruits small pods, resin-dotted, Aug.
Similar species: (1) Shrubby Cinquefoil is lower, has shreddy bark and fewer leaflets. (2) Shining Indigobush has shiny leaves; lower indigobushes have stalkless leaves and leaflets.

SHINING INDIGOBUSH **Not illus.**
Amorpha nitens F. E. Boynt.
Recognition: Differs from Dull-leaf in having thin *glossy leaflets* and fruit pods that lack dots when viewed through hand lens. Twigs and leaves almost hairless. Flowers May–June. Height to 10′. Floodplains; s. Illinois to Georgia and Arkansas.

DOWNY INDIGOBUSH **Leaflet illus., p. 164**
Amorpha canescens Pursh

Recognition: Buds, fruits, and half-inch-long leaflets of this low shrub typically are *white-hairy,* rarely nearly hairless. Leaflets 15–51, *nearly lacking stalks,* narrow or oblong, usually with blunt tips. Called Leadplant, it once was thought to indicate presence of lead. Leaves 1″–4″. Height to 4′. Flowers June–Aug. Fruits Aug.–Sept. Dry open places; s. Michigan and Saskatchewan to Indiana, Arkansas, Texas, and New Mexico.

FRAGRANT INDIGOBUSH **Leaflet illus., p. 164**
Amorpha nana Nutt.

Recognition: Similar to Downy Indigobush but nearly *hairless;* with leafstalks very *short or lacking.* Flower clusters *mostly single, unbranched,* less than 4″. Height to 3′. Flowers June–July. Fruits July–Aug. Grasslands; Manitoba and Saskatchewan to Iowa and Kansas.

MISSOURI INDIGOBUSH **Not illus.**
Amorpha brachycarpa Palmer

Recognition: Differing from Fragrant Indigobush principally in having *branched* flower-bearing stalks 4″–10″ long. Height to 3′. Flowers May–Aug. Open areas; Missouri.

VIRGINIA CREEPER **p. 164**
Parthenocissus quinquefolia (L.) Planch.

Recognition: A climbing vine with tendrils and *fan-compound* leaves. Leaflets 5 (rarely 3 or 7), toothed, arranged like *spokes of wheel,* hairy or hairless, dull above. Tendrils rather long, slender, *disk-tipped,* with several branches. Buds scale-covered, twigs hairless, pith white and continuous. Bundle scars numerous; tendrils absent opposite every 3rd leaf. Bark tight, often dotted. Leaves 3″–8″. Flowers small, greenish, clustered, June–Aug. Fruits blue berries, 3⁄16″–5⁄16″, Aug.–Feb.

Similar species: This and (1) Thicket Creeper only vines with fan-compound leaves and slender-tipped tendrils. (2) Boston Ivy (p. 187) only other vine with tendrils disk-tipped, has simple evergreen leaves, very short tendrils, and short distances between leaves and tendrils. (3) Poison-ivy (Plate 25) has 3-parted leaves and climbs by aerial rootlets.

Remarks: Blue fruits eagerly consumed by numerous birds, including all game species within area; also eaten by mice, chipmunks, and skunks. Foliage and twigs cropped by whitetail deer.

THICKET CREEPER **Tendrils illus., p. 164**
Parthenocissus inserta (Kerner) K. Fritsch

Recognition: Similar to Virginia Creeper, but tendril tips *with-*

out adhesive disks. Leaves shiny; fruits 5/16″–7/16″. Slender-tipped branched tendrils, tight bark, and white pith distinguish it in winter. Flowers June–July. Fruits Aug.–Oct. Woods and thickets; Nova Scotia, Quebec, Manitoba, and Montana to Florida, Texas, and California.

AMERICAN WISTERIA *Wisteria frutescens* (L.) Poir. **p. 164**

Recognition: A high-climbing vine with *feather-compound toothless* leaves, twining branches, smooth tight bark, sometimes slightly ridged twigs, silky buds, single bundle scars, beautiful flower clusters, and *hairless* knobby beanlike fruit pods. Leaflets 9–15, elliptic, ½″–¾″ wide. Flower clusters less than 4½″ long. Small raised knobs adjoin leaf scars. Leaves 3″–8″. Flowers showy clusters, purplish or white, April–June. Fruits Sept.–Nov., or longer.

Similar species: American, (1) Kentucky, (2) Chinese, and (3) Japanese Wisterias are the only vines with feather-compound leaves not toothed; also only vines climbing by twining stems that have single bundle scars and leaf scars with flanking warty knobs. *Wisteria* species difficult to separate unless flowers or fruits are present.

KENTUCKY WISTERIA **Not illus.**
Wisteria macrostachya Nutt.

Recognition: Fruit pods *hairless.* Leaflets 9–15, somewhat rounded at base, *long-pointed* and ⅞″–1⅞″ wide. Flower clusters 6″–12″ long. Floodplains of Mississippi drainage; Kentucky, s. Illinois, and Missouri to Louisiana and Texas.

CHINESE WISTERIA *Wisteria sinensis* Sweet **Not illus.**

Recognition: Fruit pods *velvety-hairy.* Leaflets silky or hairless, 7–13. Flower clusters *6″–8″* long, all blossoms opening at once, slightly fragrant. *Northeastern;* escaped to thickets and woods; s. New England to Virginia and Illinois.

JAPANESE WISTERIA **Not illus.**
Wisteria floribunda (Willd.) DC.

Recognition: Similar to Chinese Wisteria but leaflets *13–19* and flower clusters *8″–20″* long, blossoms opening successively, starting at base, very fragrant. Locally escaped; Massachusetts to Louisiana.

WESTERN SOAPBERRY **Not illus.**
Sapindus drummondi H. & A.

Recognition: This medium-sized plains tree has feather-compound leaves with *8–18 narrow, sharply pointed,* somewhat *leathery* leaflets not toothed. End leaflets usually lacking. Buds small, fuzzy, globular, with 2 visible scales; may occur one above the other; end one false. Leaf scars triangular, with 3 large indistinct bundle scars. Bark light gray, scaly. Pulp of clustered fruits reportedly poisonous and forms lather in water. Flowers white, clustered, May–June. Fruits ball-shaped, white, Sept.–Oct. or longer. Leaves 4″–15″. Height 20′–50′ (75′); diameter 10″–18″ (24″). Bottomlands; sw. Missouri, Kansas, s. Colorado, and Arizona to w. Louisiana and s. Texas.

Thornless Plants with Leaves Twice-compound

(*Plate 31, p. 166*)

Only these few plants and 2 thorny ones (Honey Locust and Hercules-club, Plate 24) have leaves in which leaflets, as well as leaves, are divided into smaller leaflets. Of those considered here, Yellowroot frequently bears leaves only once compound.

YELLOWROOT *Xanthorhiza simplicissima* Marsh **p. 166**

Recognition: A low shrub with once- or, less commonly, twice-compound leaves. Leaflets pointed and deeply toothed. Wood of both roots and upper parts bright *yellow*. Leaf scars narrow, more than half encircling twig; bundle scars numerous. Side buds small, blunt, and few-scaled; end bud much larger, with about 5 scales. Leaves 4″–10″. Height to 3′. Flowers purplish, in drooping clusters, April–May. Fruits small, dry.

Similar species: Yellow wood and nearly encircling leaf scars are certain identification marks. Yellowwood (Plate 30) is taller, has leaflets not toothed, and leaf scars U-shaped.

PEPPER VINE *Ampelopsis arborea* (L.) Koehne **p. 166**

Recognition: Either bushy and somewhat upright or a climbing vine with *twice- or even thrice-compound* leaves. Climbs by means of slender *branched* tendrils that are mostly present opposite upper leaves. Leaflets large-toothed. Twigs hairless or nearly so; buds small. Pith white and continuous. Leaves 2″–8″. Flowers small, greenish, clustered, June–July. Fruits black berries, bitter, inedible, Aug.–Nov.

Similar species: Grapes (Plates 34 and 35) have simple leaves and brown, mostly partitioned pith. (1) American and (2) Asiatic Ampelopsis (Plate 35) have simple leaves and unbranched tendrils.

CHINABERRY *Melia azedarach* L. **Not illus.**
Recognition: An oriental tree widely planted in dooryards in South and often escaped to the wild. Leaves twice-compound (roughly resembling those of Pepper Vine), with toothed leaflets. Twigs stout and hairless. Buds small, nearly spherical, fuzzy. Leaf scars large, somewhat 3-lobed, with 3 groups of scattered bundle scars. End buds false. Pith white. Leaves 4″–12″. Height to 40′. Flowers purplish with unpleasant odor, clustered, May–June. Fruits *yellowish, ball-like,* usually present. E. Virginia and se. Oklahoma to Florida and centr. Texas.

COFFEE-TREE *Gymnocladus dioica* (L.) K. Koch **p. 166**
Recognition: A tall tree with *very large twice-compound* leaves. Leaflets *very numerous,* pointed, *not toothed.* Twigs very stout, somewhat whitened; leaf scars large, 3–5 bundle scars. Buds silky, sunk in bark, often one above the other. End buds false; pith pinkish. Bark dark and scaly. Leaves 17″–36″. Height 40′–60′ (100′); diameter 1′–2′ (3′). Flowers whitish, clustered, May–June. Fruits 2″–10″ brown pods, Sept.–winter.
Similar species: Only other thornless trees with twice-compound leaves are (1) Albizzia and (2) Prairie Acacia, with fernlike leaves, and (3) Chinaberry, with toothed leaflets. In winter the combination of false end buds and sunken lateral buds is distinctive among species with double characteristic of many bundle scars and large leaf scars.
Remarks: As a shade tree, often planted in city parks along eastern seaboard; sometimes escapes. Native mostly west of Appalachians. One of few members of pea family which do not grow bacterial root nodules capable of fixing nitrogen. Seeds were roasted and used as coffee in some areas during Civil War. Indians are supposed to have roasted seeds, but they ate them as nuts. Pulp between seeds, however, reported to be poisonous and cattle have been made sick by leaves or fruits dropping into their drinking water. Reddish wood is strong and coarse but takes a good polish. Useful in cabinetwork and for fence posts and railroad ties.

ALBIZZIA *Albizzia julibrissin* Durazzini **p. 166**
Recognition: A small tree with feathery, *fernlike twice-compound* leaves. On being handled, leaflets *close like pages of a book.* Twigs hairless, slender, leaf scars small, with 3 bundle scars. Buds few-scaled, small, blunt, not sunk in bark, sometimes occur one above the other; end buds false. Pith whitish. Bark smooth, light brownish. Leaves 5″–8″. Height 20′–40′; diameter 6″–12″. Flowers powder-puff-like, pink, June–Aug. Fruits beanlike pods 2″–3″.
Similar species: Prairie Acacia has hairy twigs.

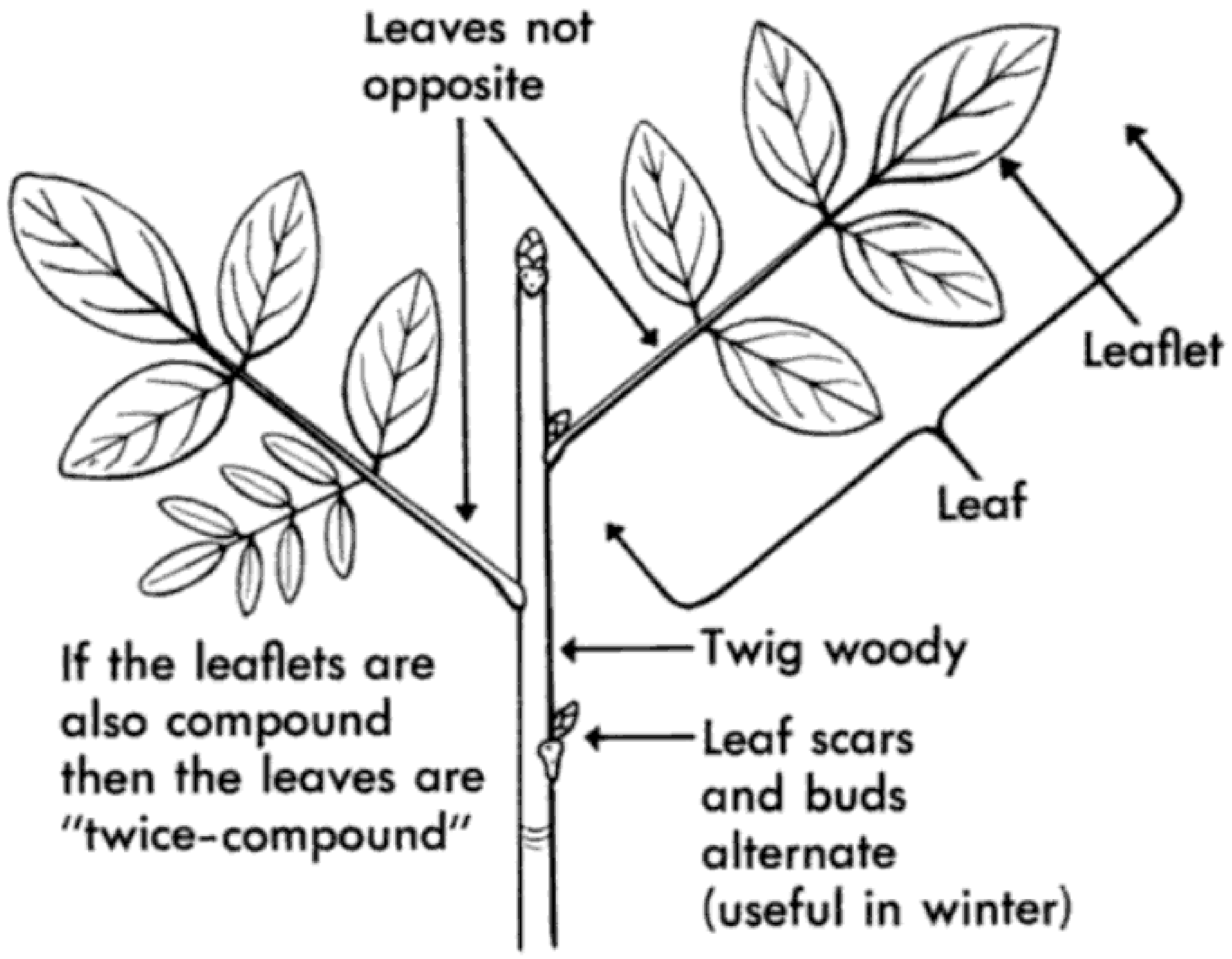
PRAIRIE ACACIA **Not illus.**

Acacia angustissima var. *hirta* (Nutt.) Robins.

Recognition: A *thornless* member of the large group of tropical and subtropical acacias. Foliage somewhat resembles that of Albizzia but twigs *quite hairy*. Leaf scars have single bundle scars; end buds false. Height to 6′. Flowers yellow or pink, in heads, June–Oct. Fruits pods, 2″–4″ long, flat. Dry soils; sw. Missouri and s. Kansas to Arkansas and Texas.

Broad-leaved Plants with Alternate Compound Leaves

(*Key, pages 122–123; text, pages 122–148*)


Leaves not opposite
Leaflet
Leaf
If the leaflets are also compound then the leaves are "twice-compound"
Twig woody
Leaf scars and buds alternate (useful in winter)

RELATIVELY few plants have compound leaves. Those with opposite leaves were presented in Section II (Plates 7–11). The remainder are in this Section. In winter, the alternate leaf scars may sometimes indicate by their large size the former presence of compound leaves. In case of doubt, however, the twigs of a leafless unknown plant with alternate leaf scars will have to be compared with the drawings of *both* Sections IV and V. **Warning:** Poison-ivy and Poison Sumac are in this group. Do not handle them. Be careful of unknown plants of this type.

PRICKLY BRAMBLES

The only groups of prickly rambling shrubs that have alternate compound leaves. Leaflets 3–11.

V RED RASPBERRY, *Rubus idaeus* p. 124
Thickets; Newfoundland, Labrador, and British Columbia to s. New England, w. Virginia, w. N. Carolina, Ohio, Indiana, Nebraska, and Wyoming.
V WINE RASPBERRY, *R. phoenicolasius* (not illus.) p. 125

V BLACK RASPBERRY, *Rubus occidentalis* p. 125
Thickets; Quebec and Minnesota to the southern states.

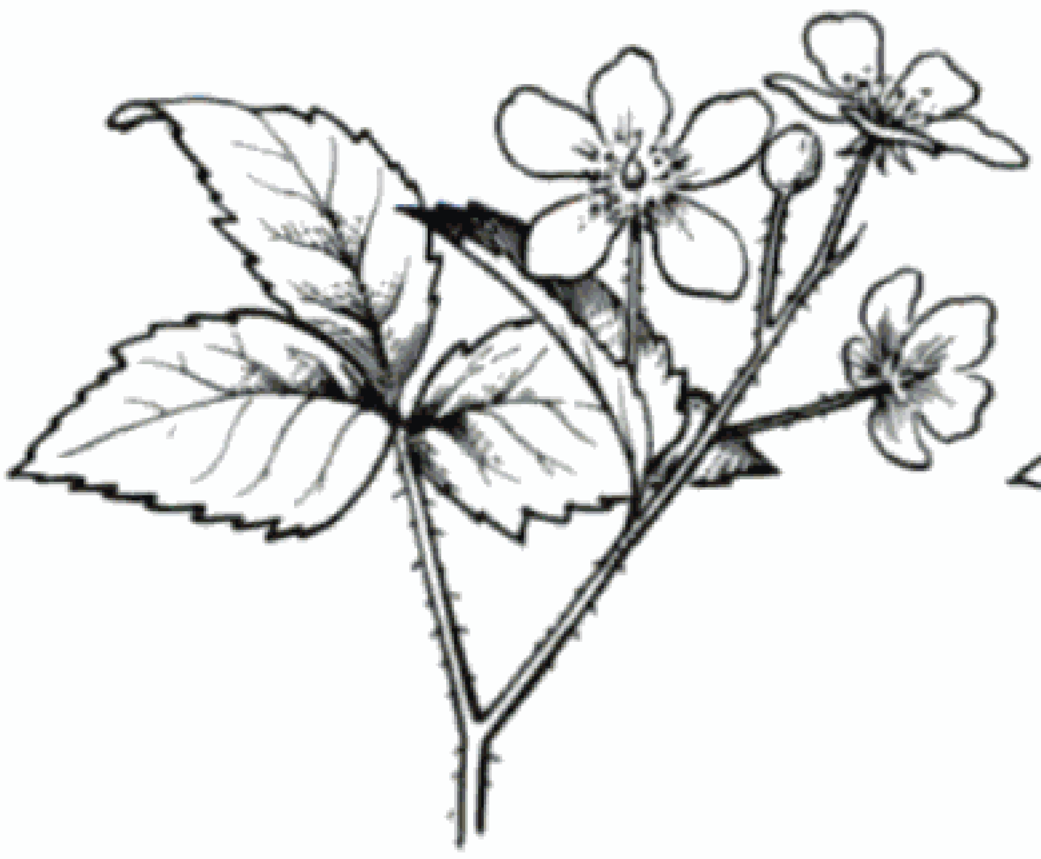
V BRISTLY DEWBERRY,[*] *Rubus hispidus* p. 125
Thickets; Prince Edward I. and centr. Ontario to Maryland, w. N. Carolina, Ohio, Illinois, and Wisconsin.

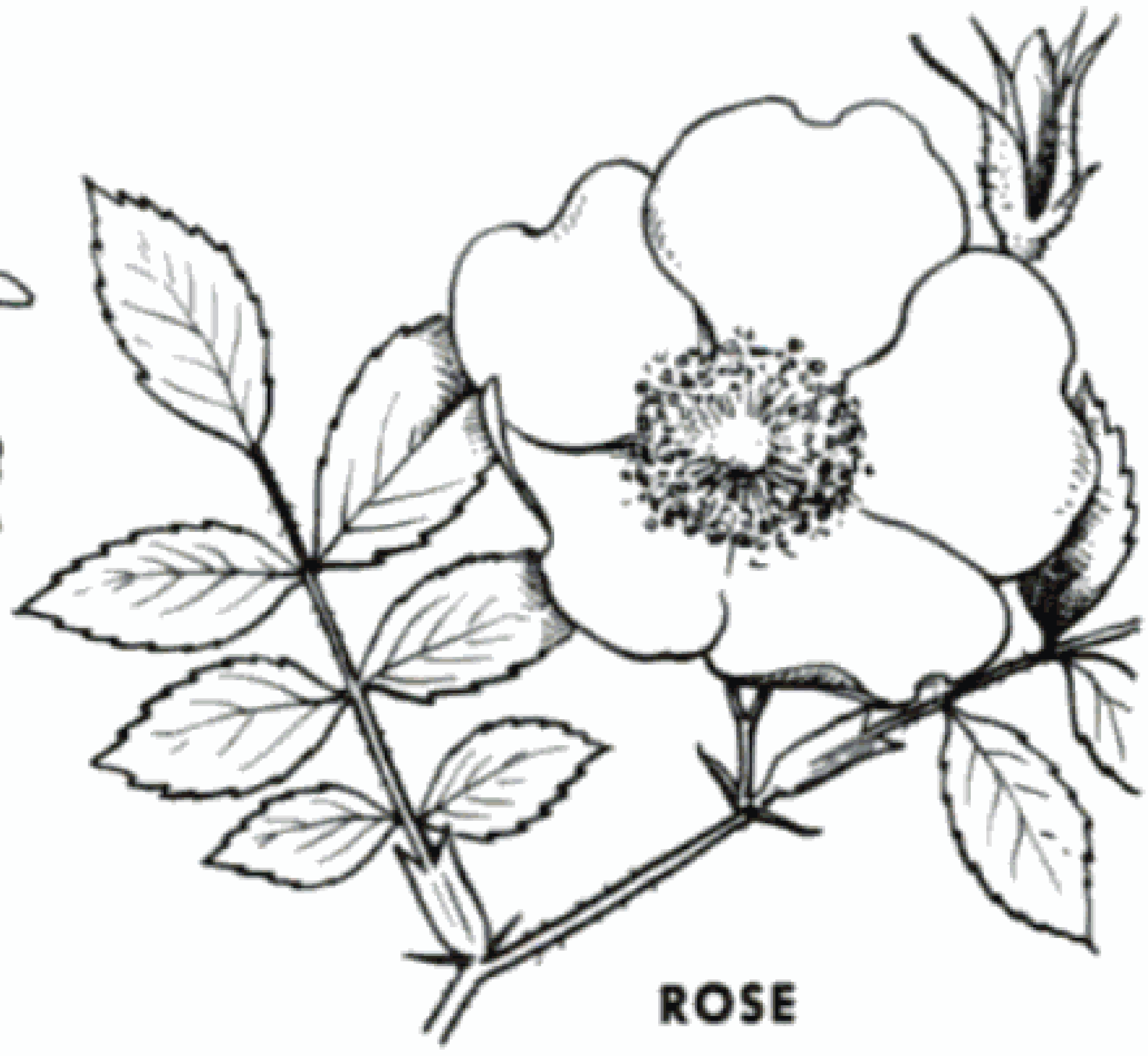
V PRICKLY DEWBERRY,[*] *Rubus flagellaris* p. 125
Thickets; Maine, sw. Quebec, s. Ontario, and Minnesota to the southern states.

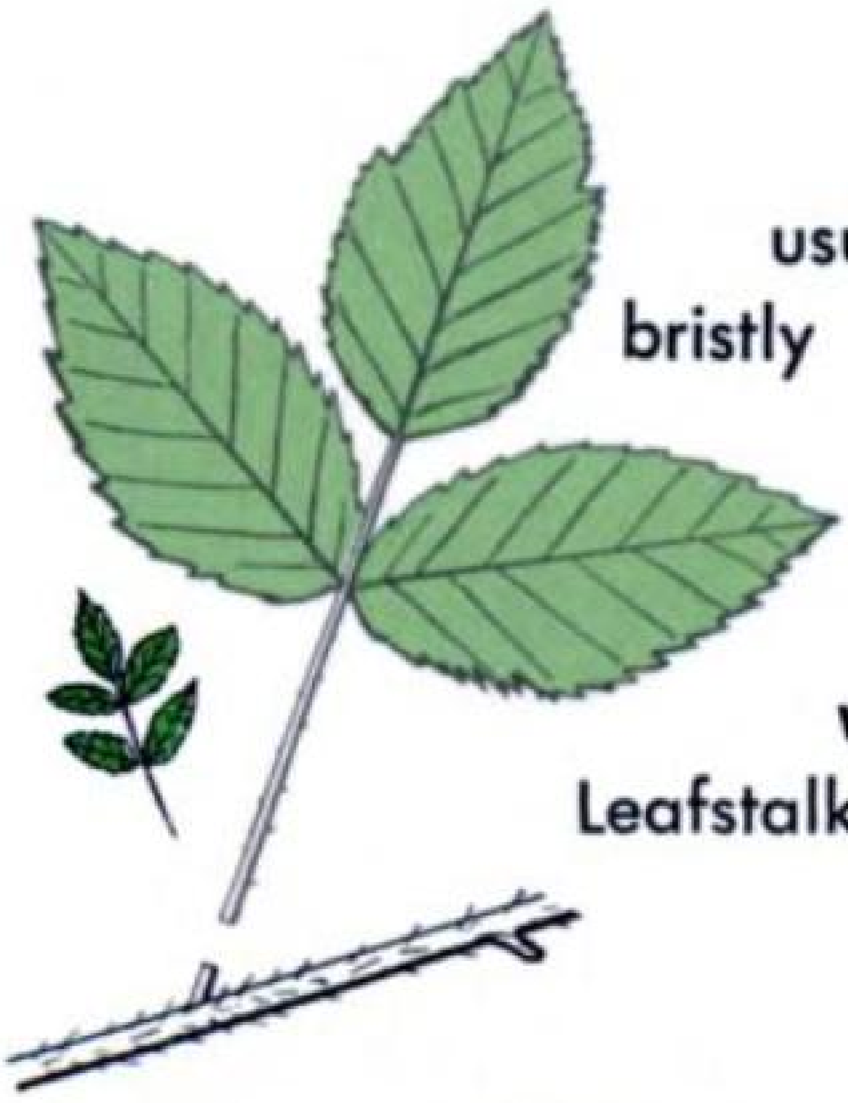
V BLACKBERRY,[*] *Rubus allegheniensis* p. 125
Thickets; New Brunswick, Nova Scotia, s. Quebec, and Minnesota to Maryland, N. Carolina, Tennessee, Indiana, and Michigan.

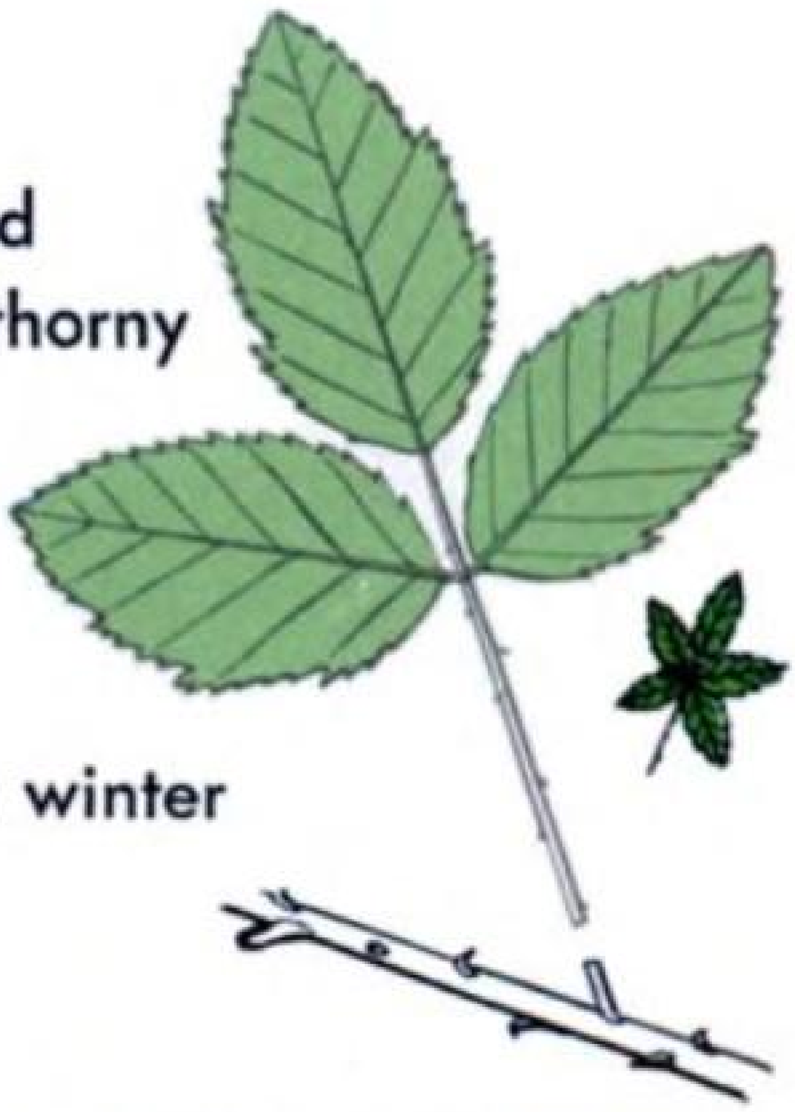
V ROSES,[*] *Rosa* spp. p. 126

[*] There are many related species. See text.


BLACKBERRY
(Raspberries and Dewberries have similar flowers)


ROSE





Stems round,
usually white-powdered

bristly

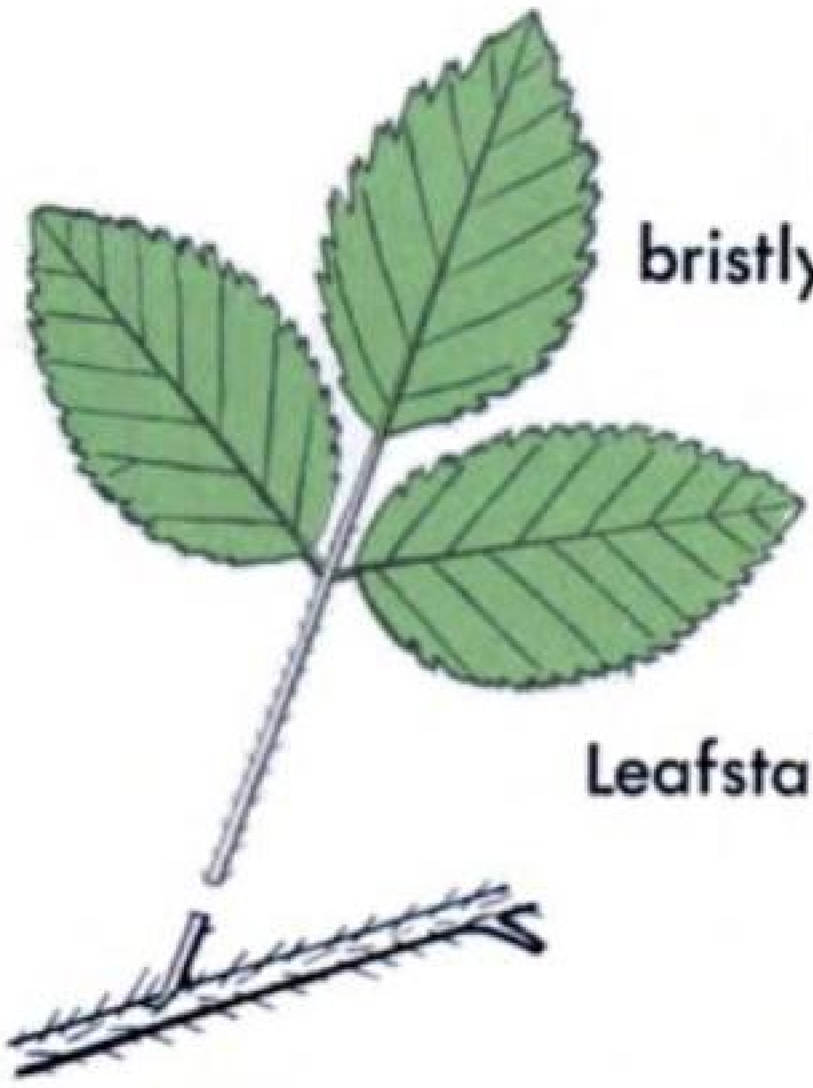
thorny

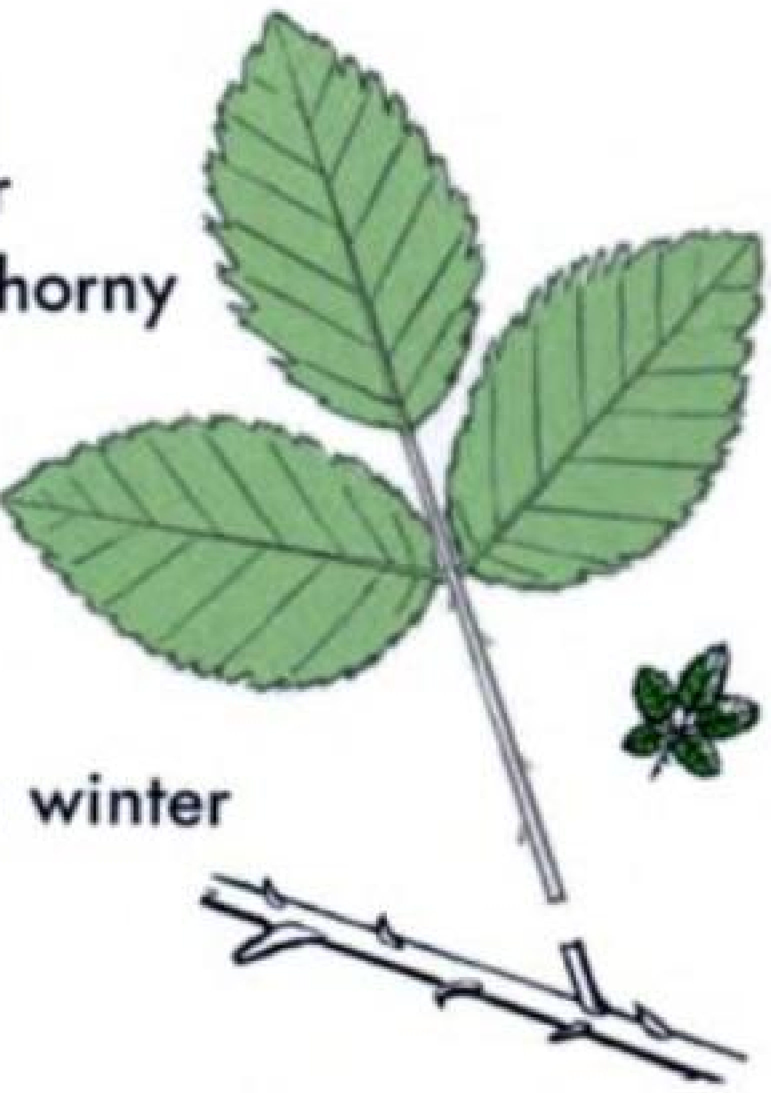
Leaflets 3–7,
very white beneath
Leafstalk bases remaining in winter

Arching shrubs

RED RASPBERRY

BLACK RASPBERRY





Stems mostly round,
lacking white powder

bristly

thorny

Leaflets 3–5
green beneath
Leafstalk bases remaining in winter

Trailing shrubs

BRISTLY DEWBERRY

PRICKLY DEWBERRY

Stems

ridged,
thorny

round,
thorny or
bristly

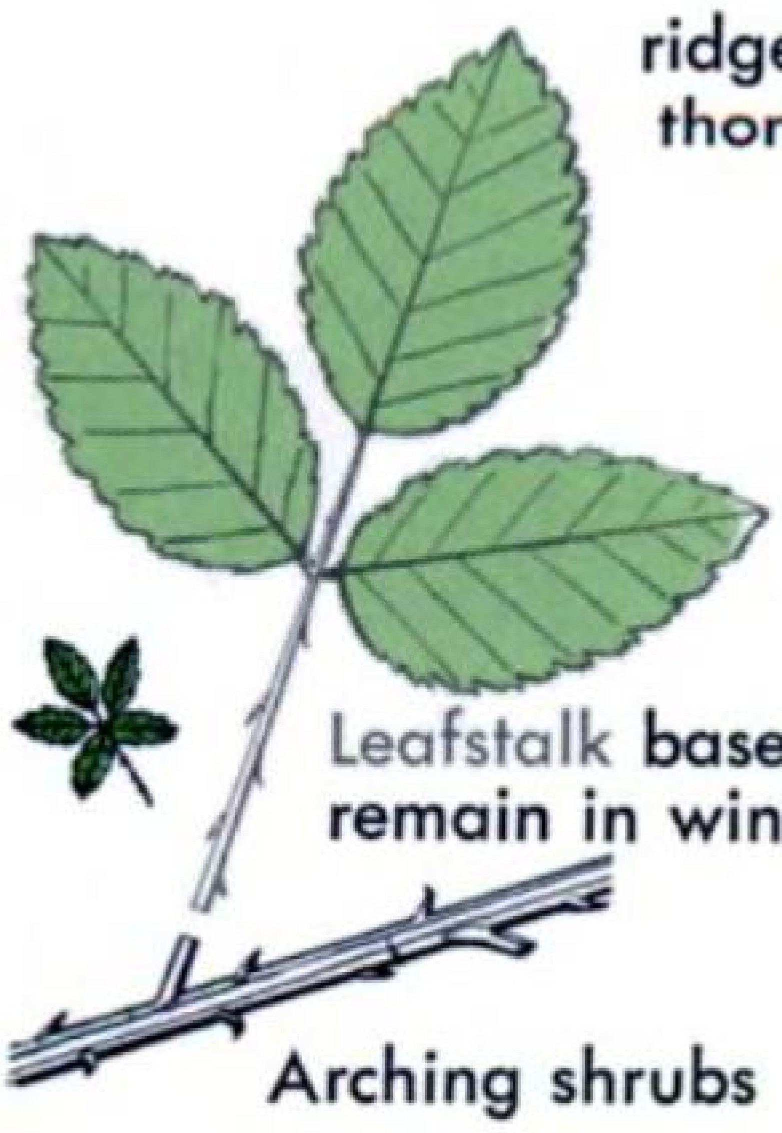
lacking white powder

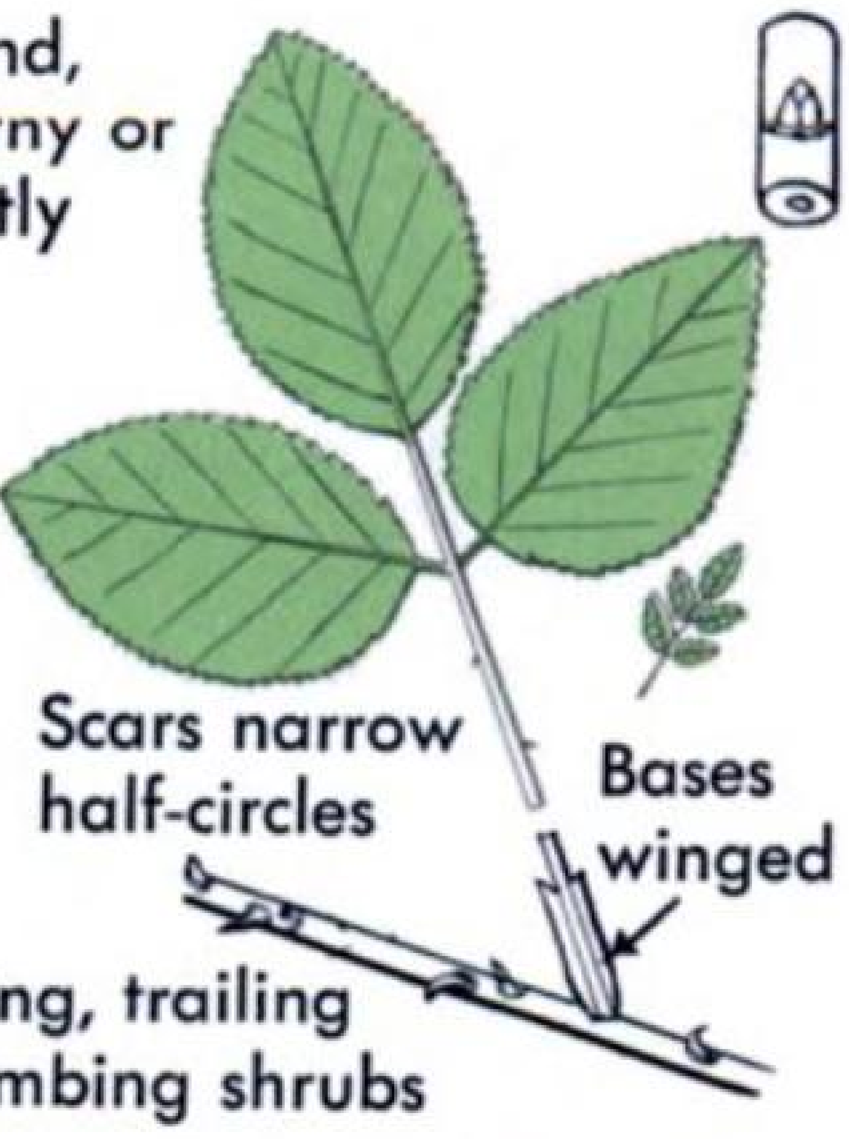
Leaflets

3–7

3–11

green beneath





Leafstalk bases
remain in winter

Arching shrubs

BLACKBERRY

Scars narrow
half-circles

Bases
winged

Arching, trailing
or climbing shrubs

ROSES

ERECT THORNY TREES AND SHRUBS

The only such plants with alternate compound leaves.

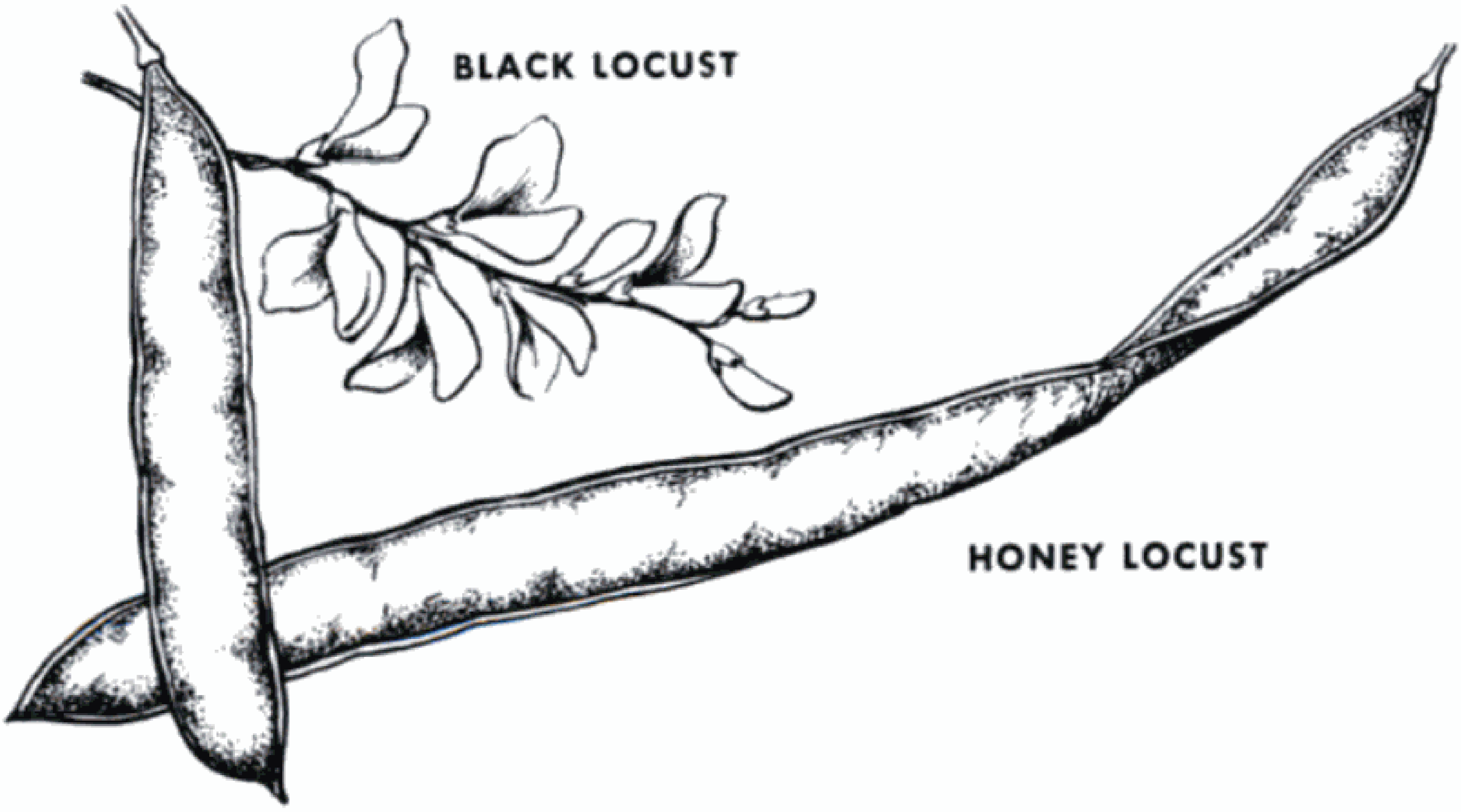
↟ HONEY LOCUST, *Gleditsia triacanthos* p. 126
Woods and fields; Nova Scotia, s. Ontario, s. Michigan, and se. S. Dakota to nw. Florida, e. Texas, and w. Oklahoma.
↟ WATER LOCUST, *G. aquatica* (thorn illus.) p. 127

↟ BLACK LOCUST, *Robinia pseudo-acacia* p. 127
Woods and fields; Nova Scotia, Quebec, and Ontario to Georgia and Louisiana and e. Oklahoma.
↟ѱ CLAMMY LOCUST, *R. viscosa* (twig illus.) p. 128
ѱ BRISTLY LOCUST, *R. hispida* (twig illus.) p. 128
ѱ DOWNY LOCUST, *R. elliottii* (not illus.) p. 128

↟ѱ HERCULES-CLUB, *Aralia spinosa* p. 128
Woods and riverbanks; s. New England, centr. New York, Michigan, and Iowa to n. Florida and e. Texas.
ѱ BRISTLY SARSAPARILLA, *A. hispida* (twig illus.) p. 128

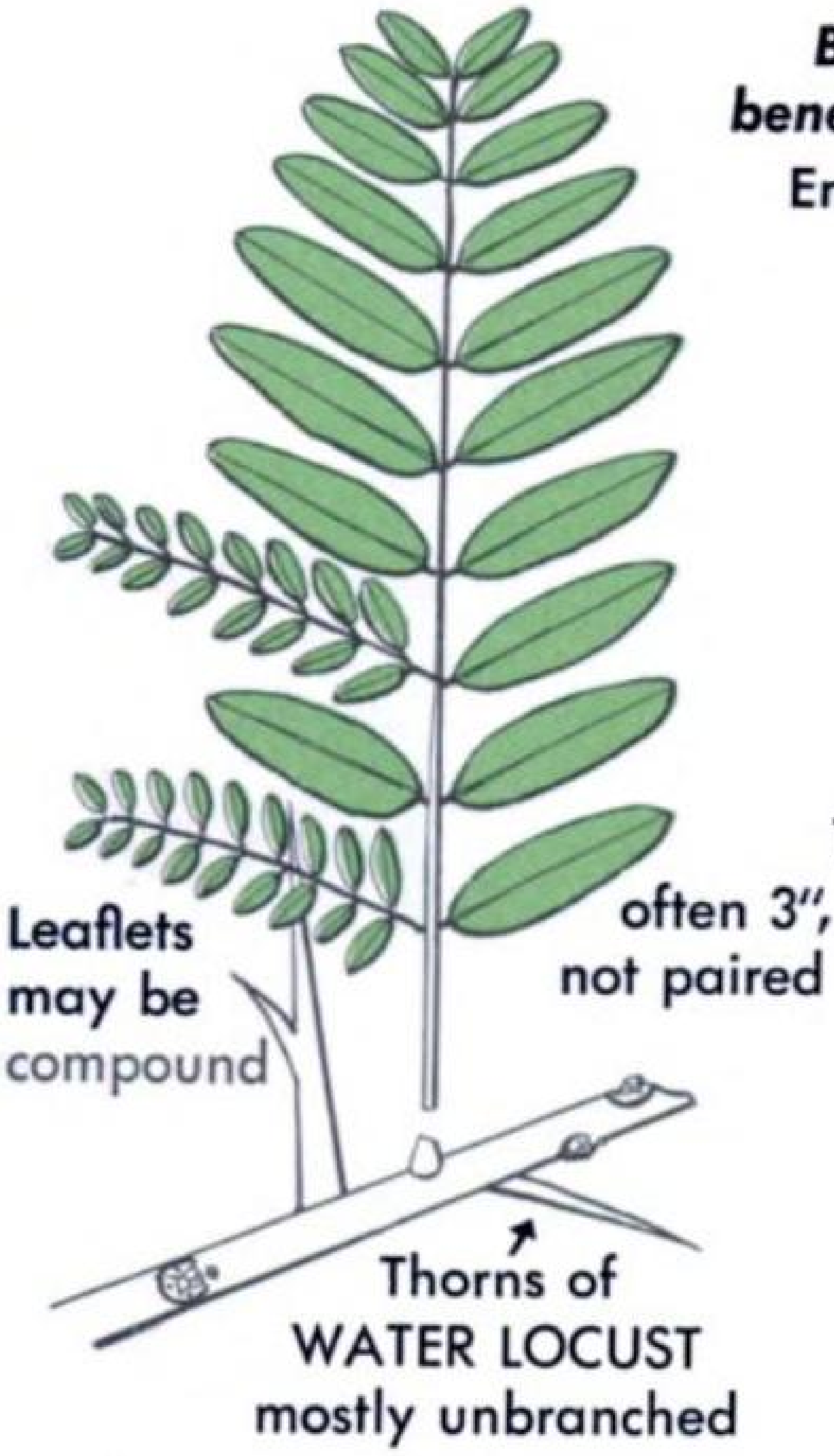
ѱ NORTHERN PRICKLY-ASH p. 129
Xanthoxylum americanum
Old fields, fertile woods, and riverbanks; w. Quebec, Ontario, and s. N. Dakota to sw. Virginia, Georgia, Alabama, and ne. Oklahoma.
↟ѱ SOUTHERN PRICKLY-ASH p. 129
X. clava-herculis (leaflet illus.)

ѱ TRIFOLIATE ORANGE, *Poncirus trifoliata* (not illus.) p. 129

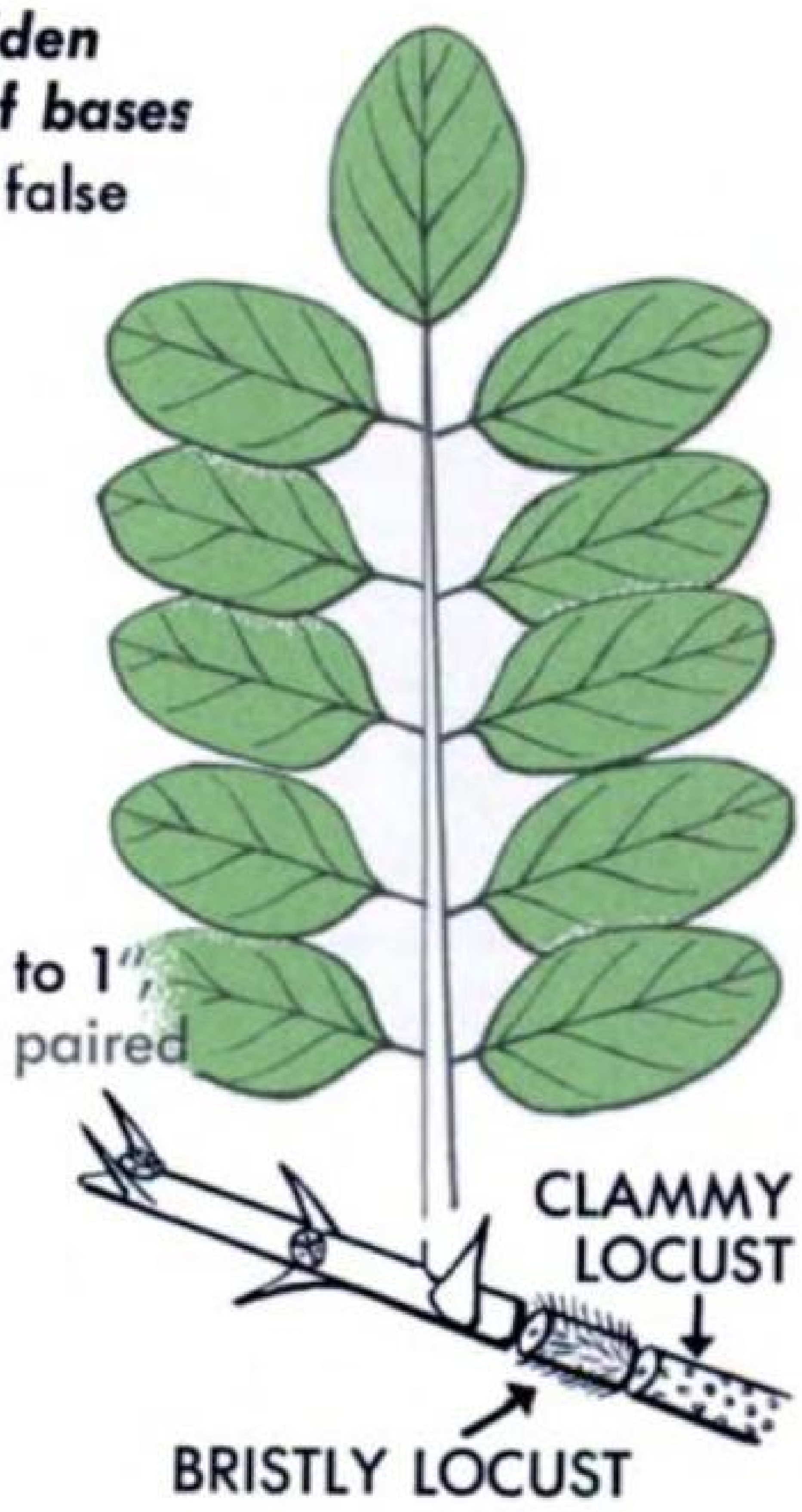


Buds hidden beneath leaf bases
End buds false

Thorns

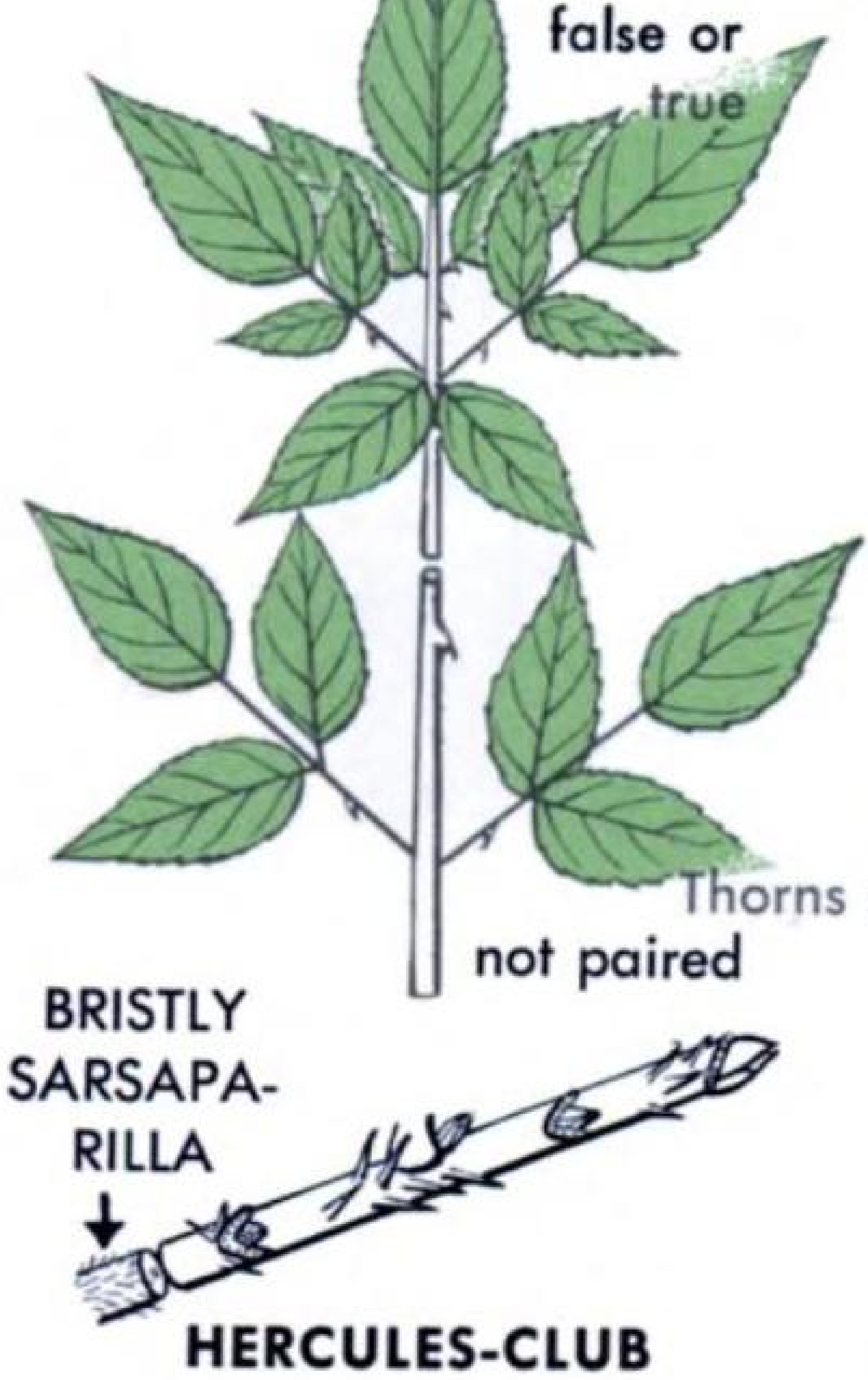

Leaflets may be compound
often 3", not paired
Thorns of WATER LOCUST mostly unbranched

HONEY LOCUST

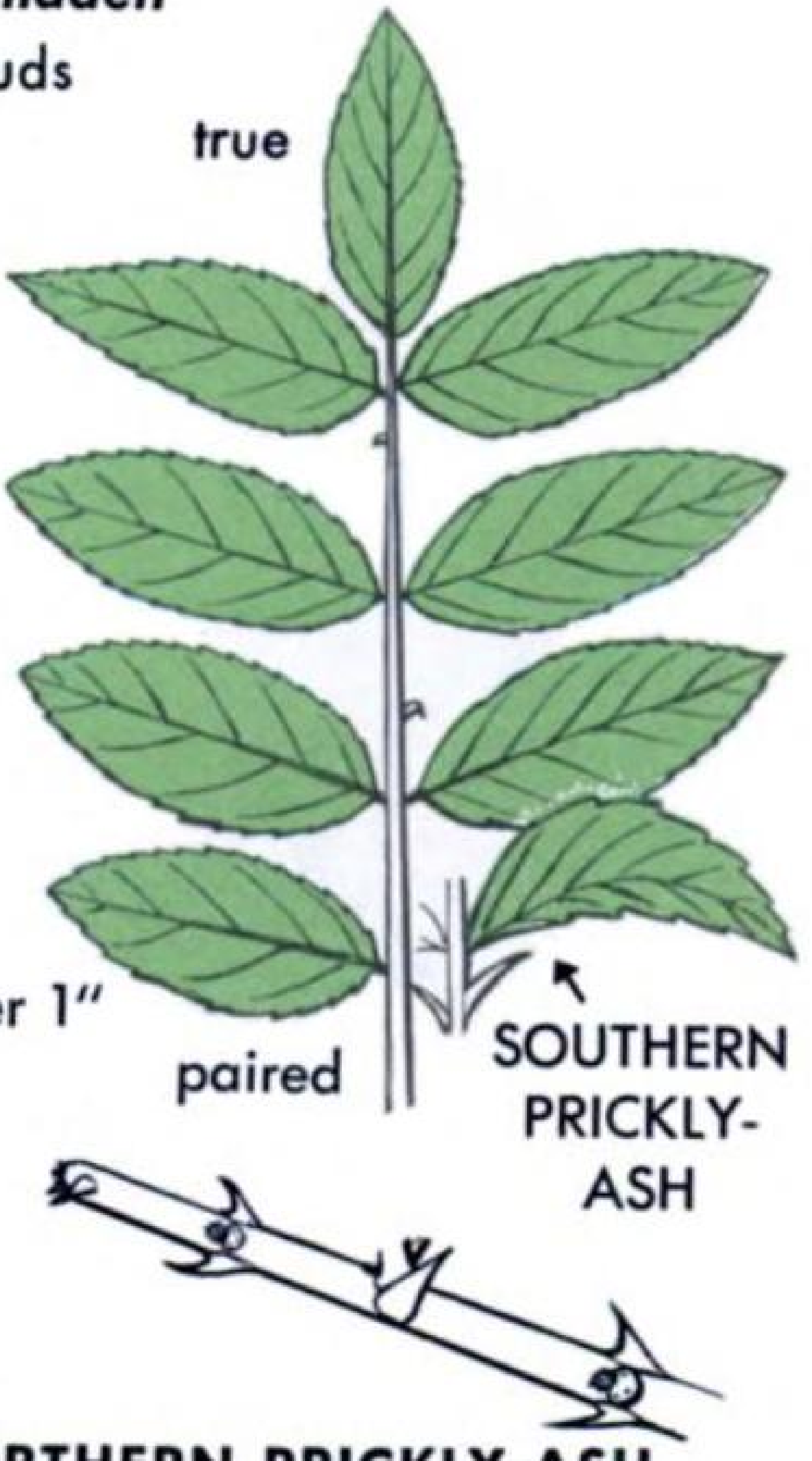

to 1", paired
CLAMMY LOCUST
BRISTLY LOCUST

BLACK LOCUST

Buds not hidden
End buds


false or true
Thorns under 1"
not paired
BRISTLY SARSAPARILLA

HERCULES-CLUB


true
paired
SOUTHERN PRICKLY-ASH

NORTHERN PRICKLY-ASH

THORNLESS TRIFOLIATES

Thornless plants whose compound leaves
are divided into only 3 leaflets.

ʃ POISON-IVY,[*] *Rhus radicans* p. 130
Woods and thickets; Quebec and s. British Columbia to Florida, Texas, and Arizona.

ᴪ POISON-OAK, *R. toxicodendron* (not illus.) p. 131

ᴪ FRAGRANT SUMAC, *Rhus aromatica* p. 131
Sandy and rocky soils; sw. Quebec, w. Vermont, n. Indiana, ne. Kansas, Nebraska, and Oklahoma to nw. Florida and e. Texas.

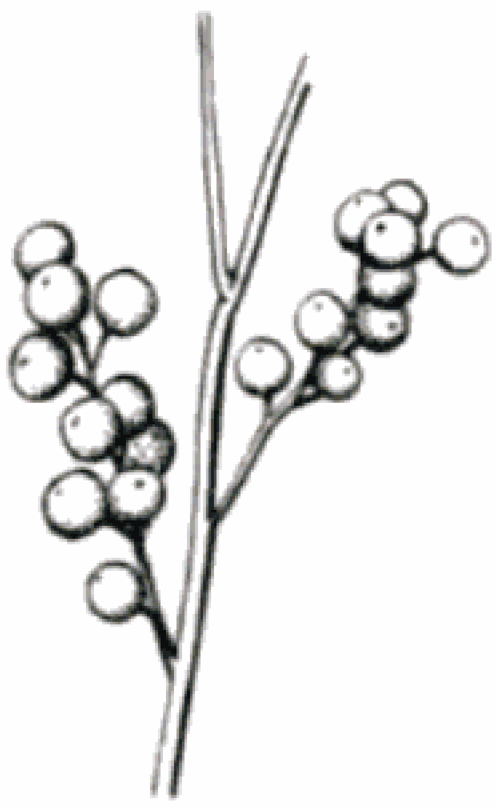
ʃ CISSUS, *Cissus incisa* (not illus.) p. 132

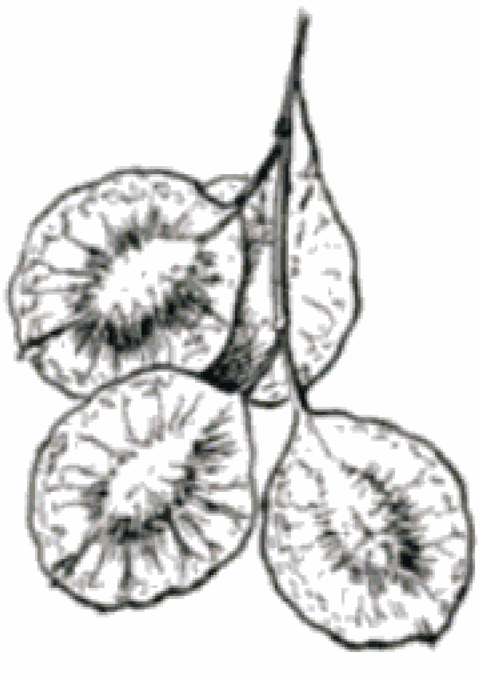
↟ᴪ HOPTREE, *Ptelea trifoliata* p. 132
Woods; Connecticut, sw. Quebec, s. Ontario, s. Michigan, and e. Kansas to n. Florida and s. Texas.

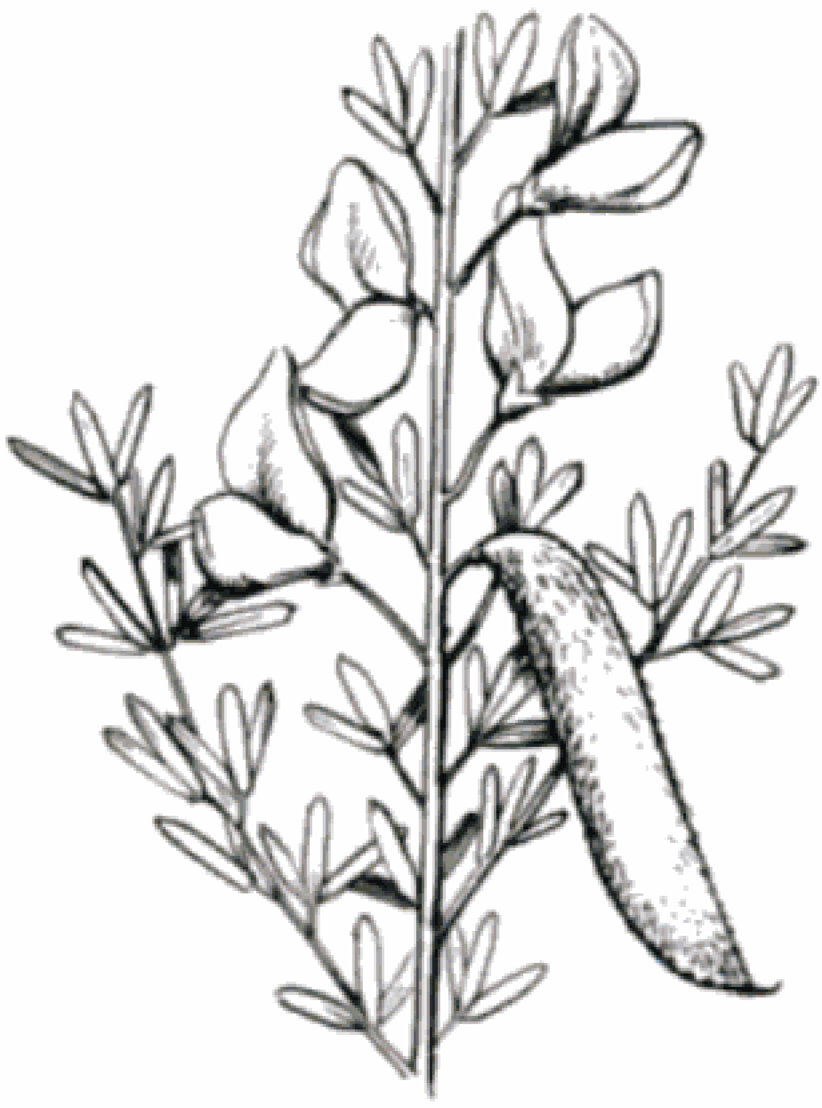
ᴪ SCOTCH BROOM, *Cytisus scoparius* p. 132
Thickets; locally in the East from Nova Scotia and w. New York to Georgia and W. Virginia.

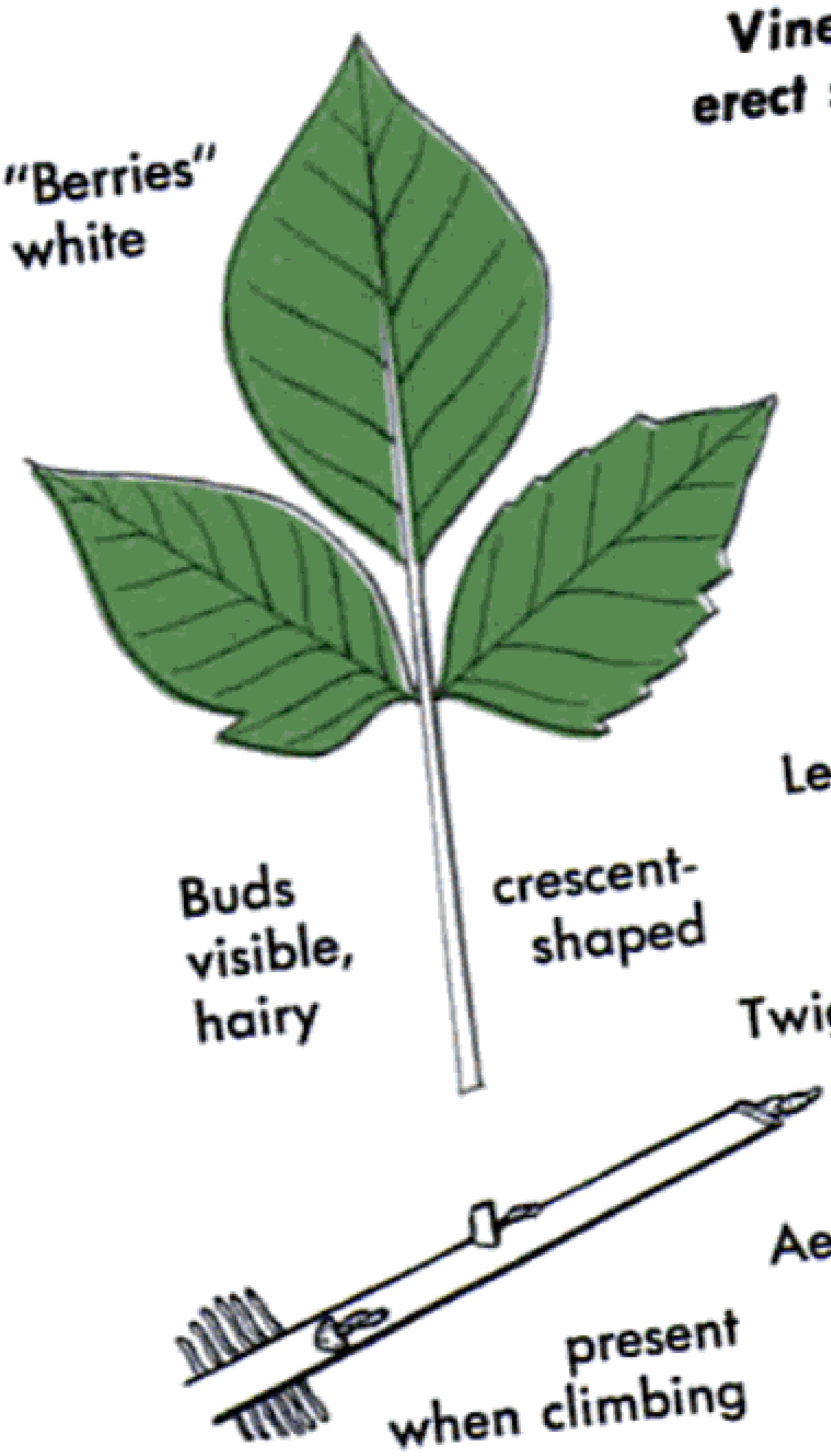
ᴪ BICOLOR LESPEDEZA p. 132
Lespedeza bicolor (not illus.)

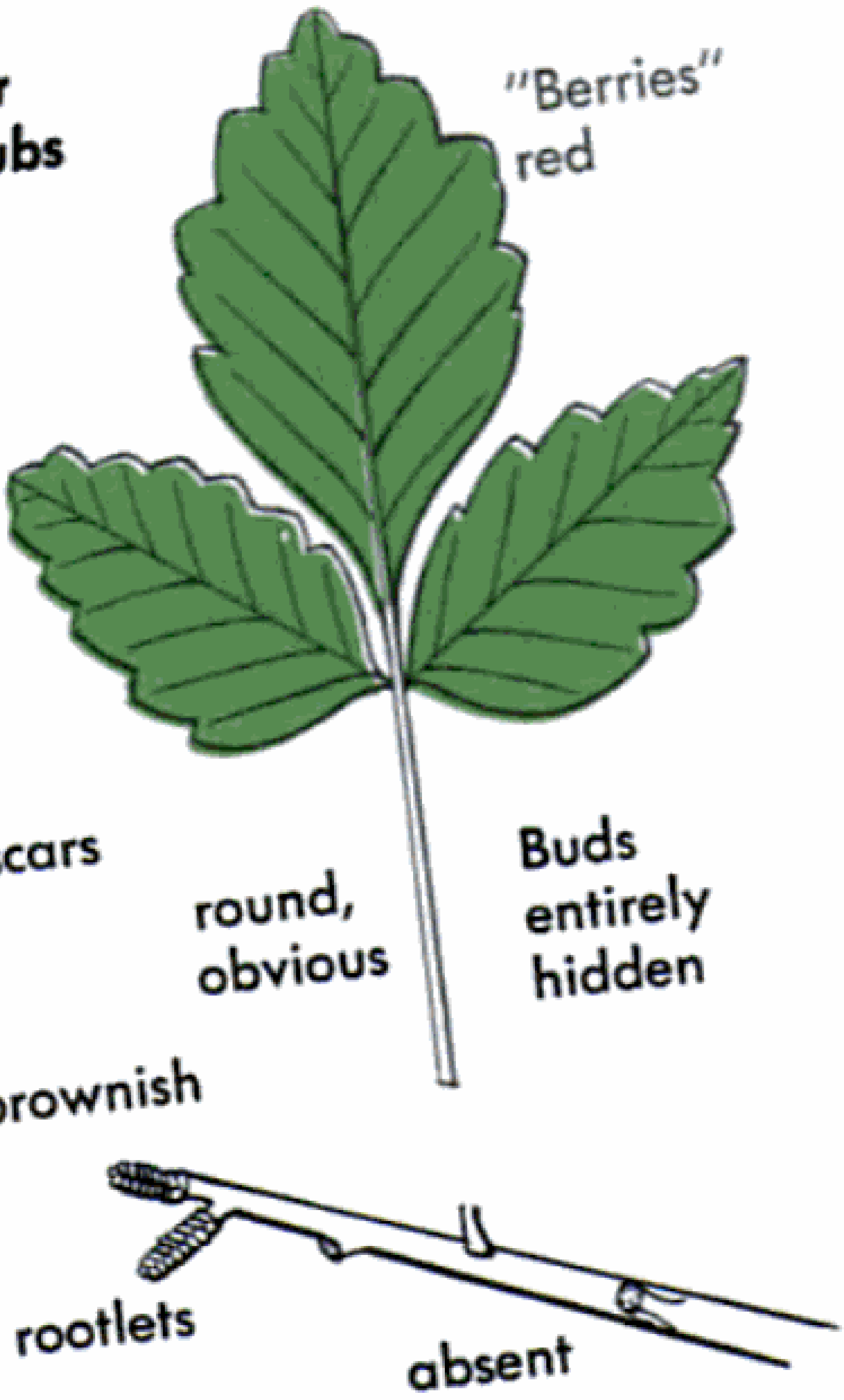
[*] May grow either as a vine or an erect shrub.


POISON-IVY

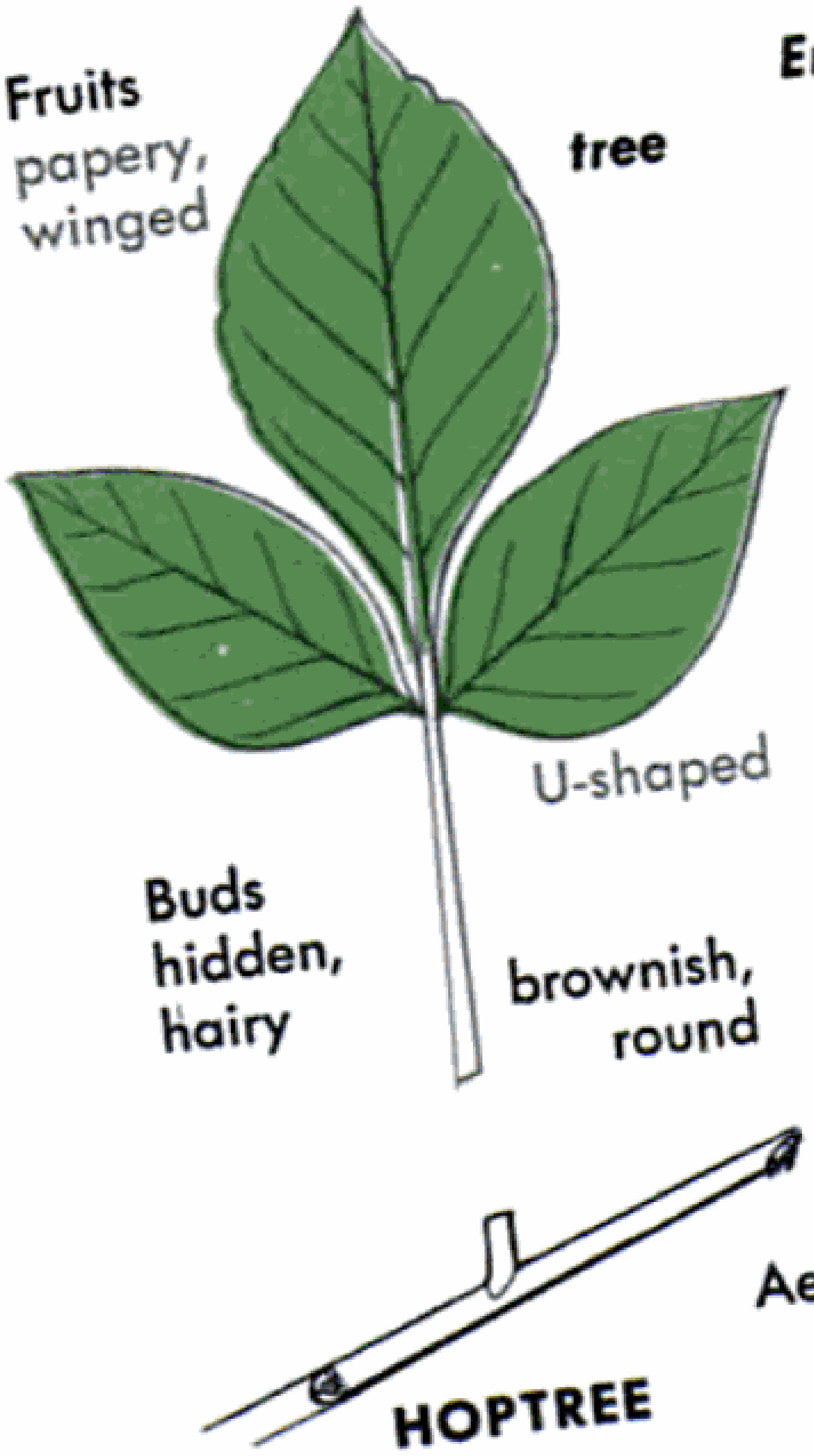

HOPTREE

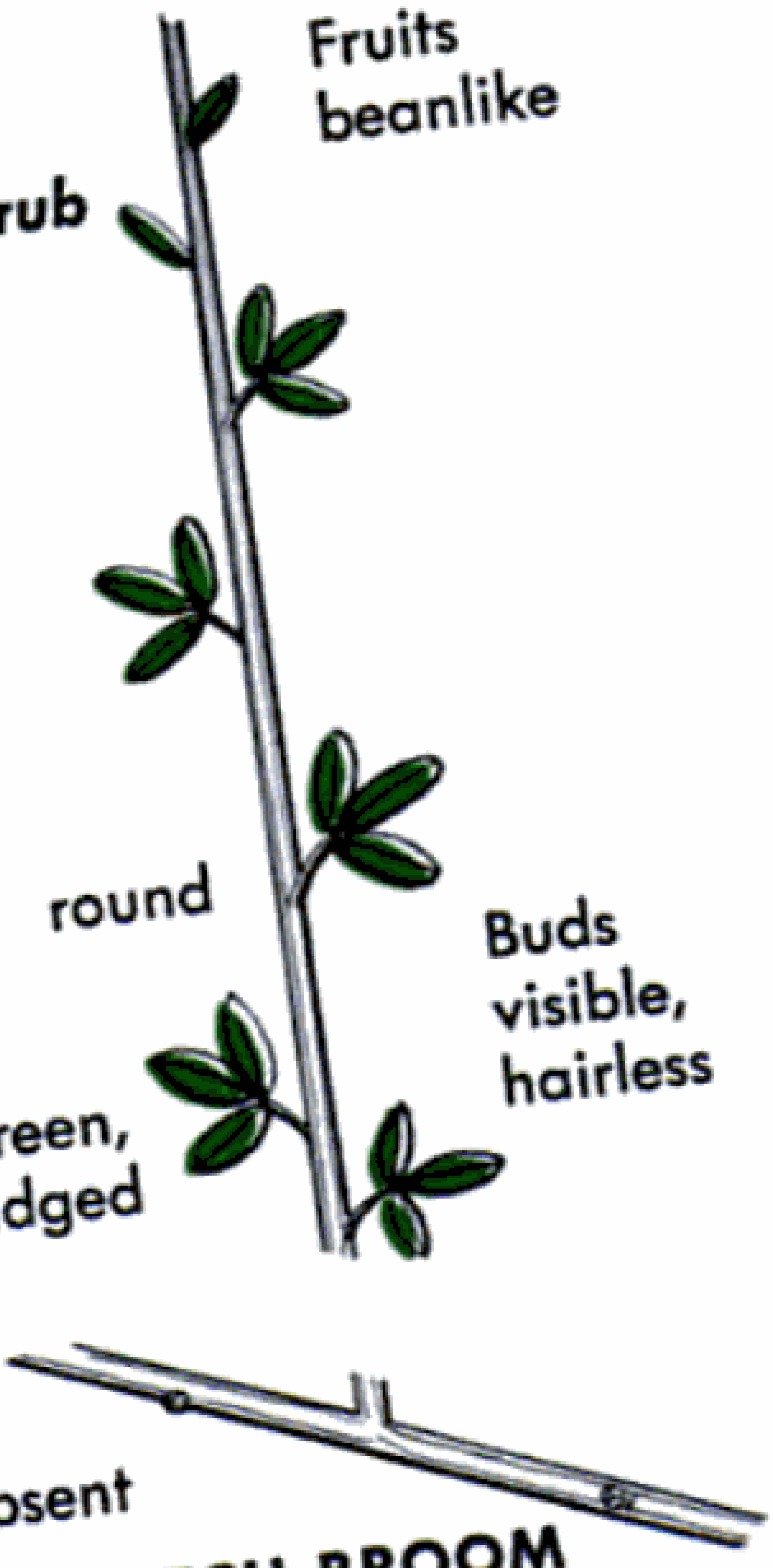

SCOTCH BROOM





POISON-IVY		FRAGRANT SUMAC
"Berries" white	**Vines or erect shrubs**	"Berries" red
crescent-shaped	Leaf scars	round, obvious
Buds visible, hairy		Buds entirely hidden
	Twigs brownish	
present when climbing	Aerial rootlets	absent





HOPTREE		SCOTCH BROOM
Fruits papery, winged		Fruits beanlike
tree	***Erect***	***shrub***
U-shaped	Leaf scars	round
Buds hidden, hairy		Buds visible, hairless
brownish, round	Twigs	green, ridged
	Aerial roots absent	

SUMACS

Shrubs or small trees. Feather-compound leaves with 7–31 leaflets. Buds mostly hidden when leaves present. Sap often mill

↟⋎ WINGED SUMAC, *Rhu*
Upland fields
cent

WALNUTS AND SIMILAR TREES

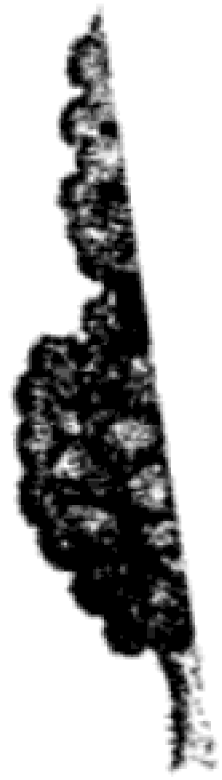
Leaves feather-compound with 7–41 toothed or glandular leaflets. Buds visible.

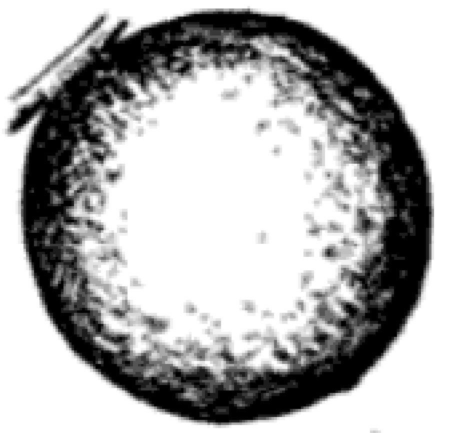
↟ BLACK WALNUT, *Juglans nigra* p. 135
Woods; w. Massachusetts, s. Ontario, s. Minnesota, and se. S. Dakota to nw. Florida, e. Texas, and w. Oklahoma.

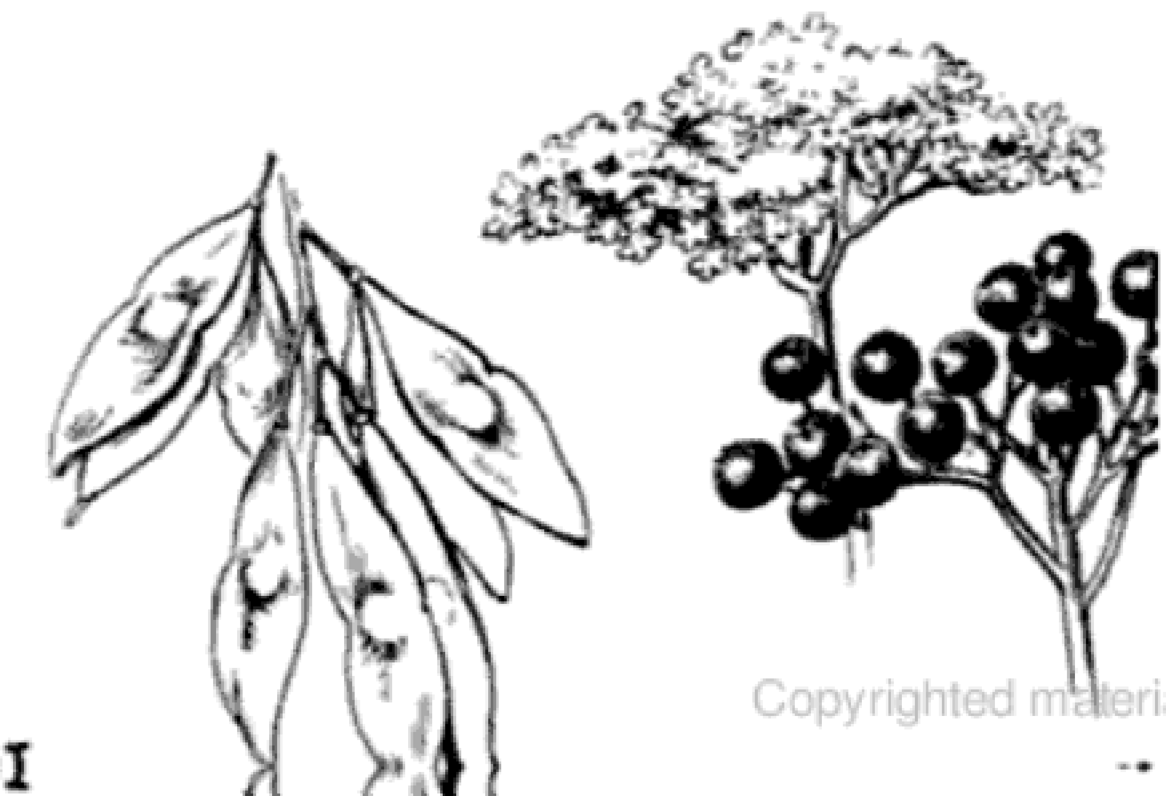
↟ BUTTERNUT, *Juglans cinerea* p. 135
Fertile woods; w. New Brunswick, s. Ontario, and se. Minnesota to w. S. Carolina, w. Georgia, n. Mississippi, and n. Arkansas.

↟ TREE-OF-HEAVEN (AILANTHUS) p. 136
Ailanthus altissima
Imported; waste places, woods, and fields; Massachusetts, s Ontario, Iowa, and Kansas to Florida and Texas. Local i the West.

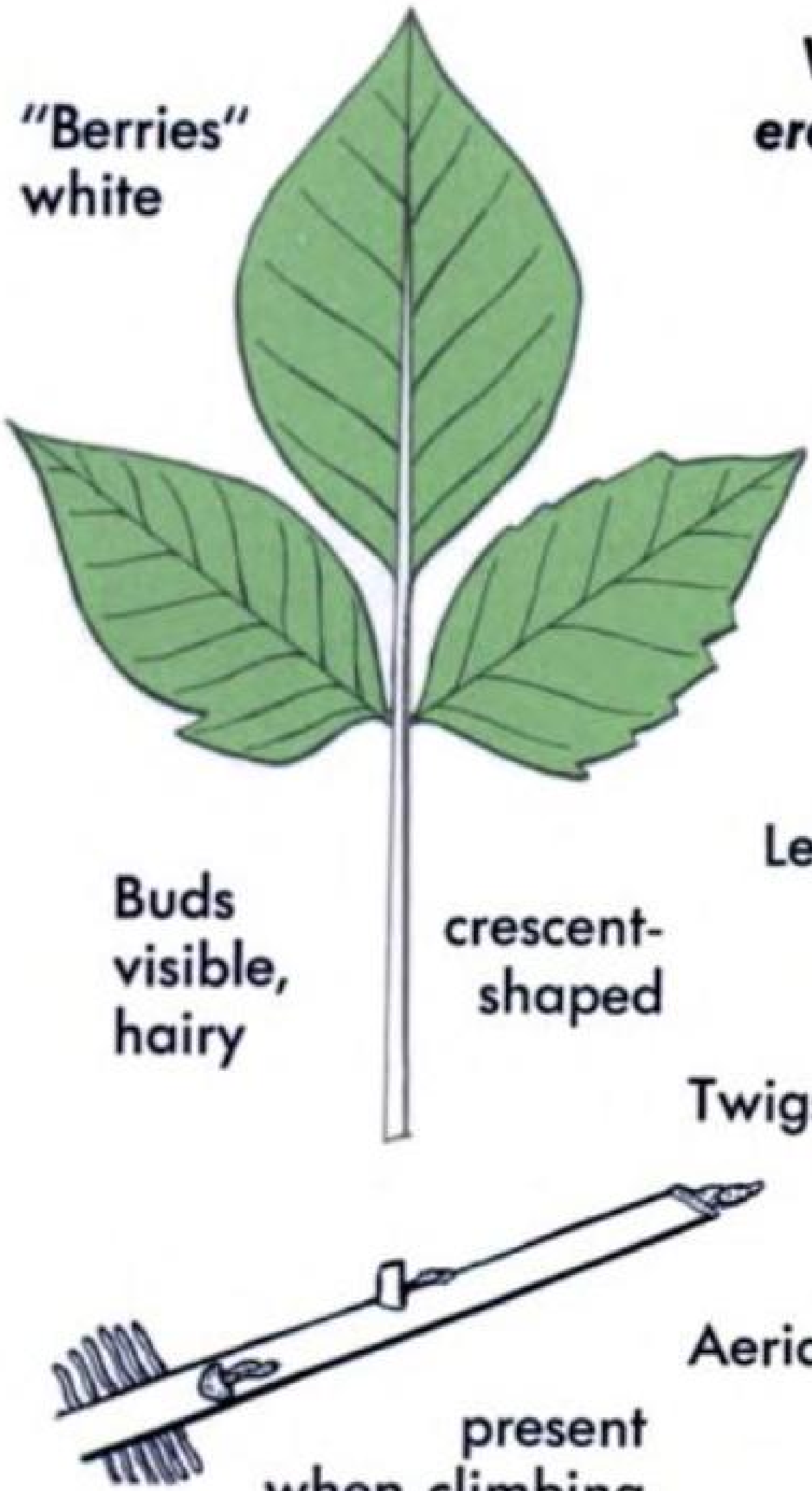
↟⋎ AMERICAN MOUNTAIN-ASH, *Pyrus americana* p. 1
Woods and openings; Newfoundland, e. Quebec, n. Michiga and se. Manitoba to n. New Jersey and n. Illinois; in m to w. N. Carolina, e. Tennessee, and n. Georgia.
↟⋎ NORTHERN MOUNTAIN-ASH p.
P. decora (leaflet illus.)
↟⋎ EUROPEAN MOUNTAIN-ASH p.
P. aucuparia (not illus.)


STAGHC
(Red)


WALNUT



Vines or erect shrubs



"Berries" white

Buds visible, hairy

crescent-shaped

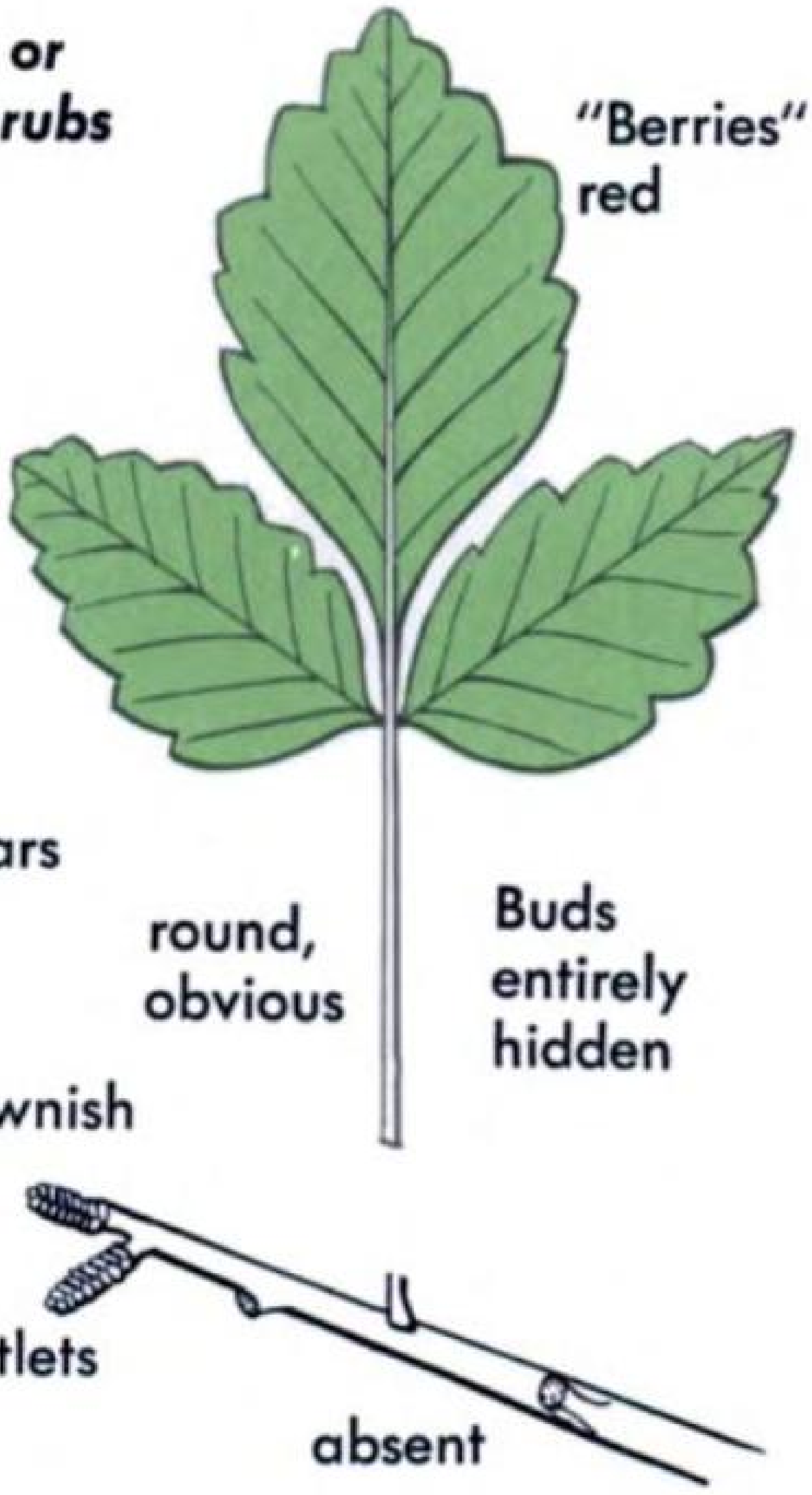
present when climbing

POISON-IVY

Leaf scars

Twigs brownish

Aerial rootlets



"Berries" red

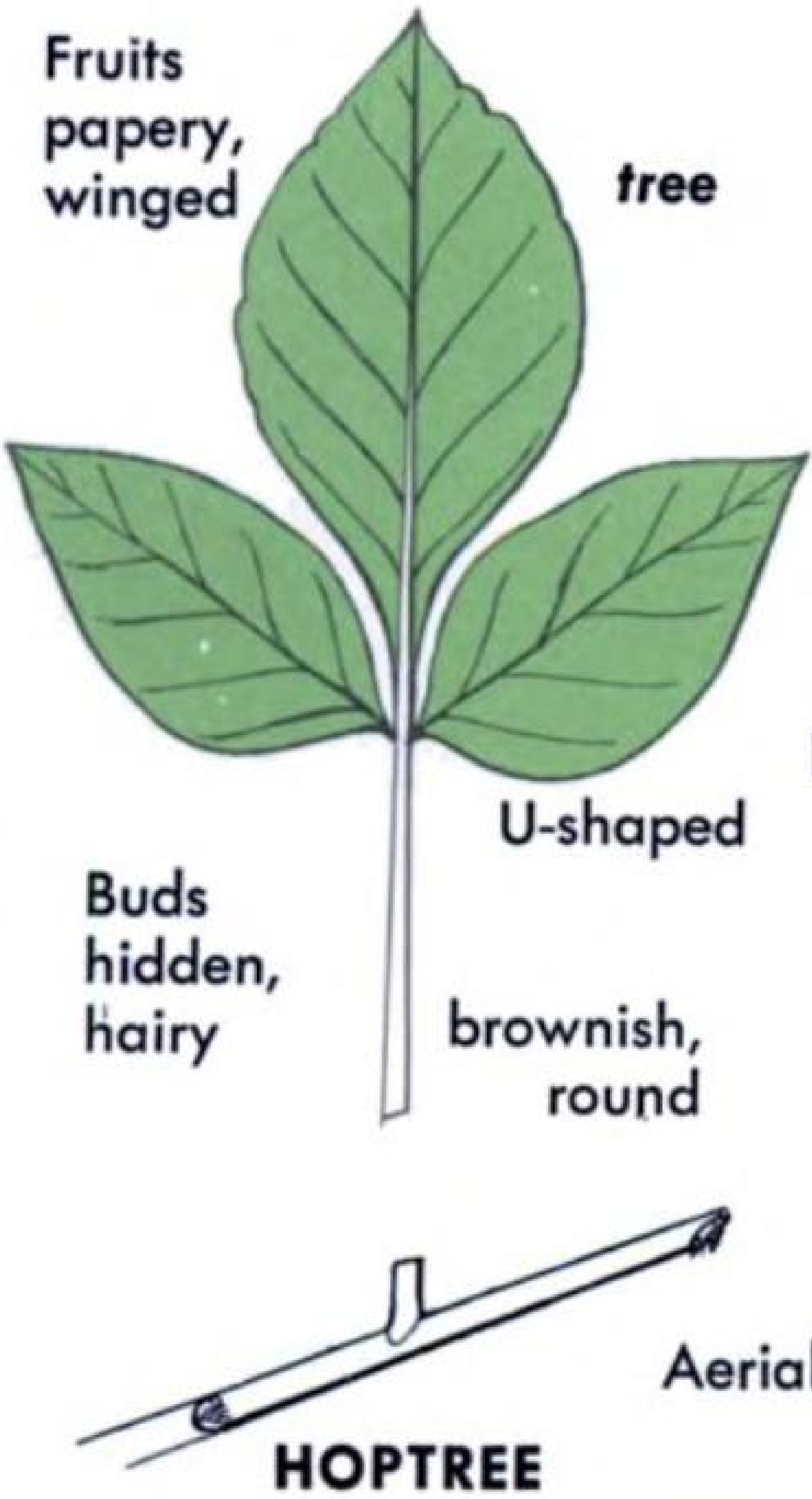
round, obvious

Buds entirely hidden

absent

FRAGRANT SUMAC

Erect tree



Fruits papery, winged

U-shaped

Buds hidden, hairy

brownish, round

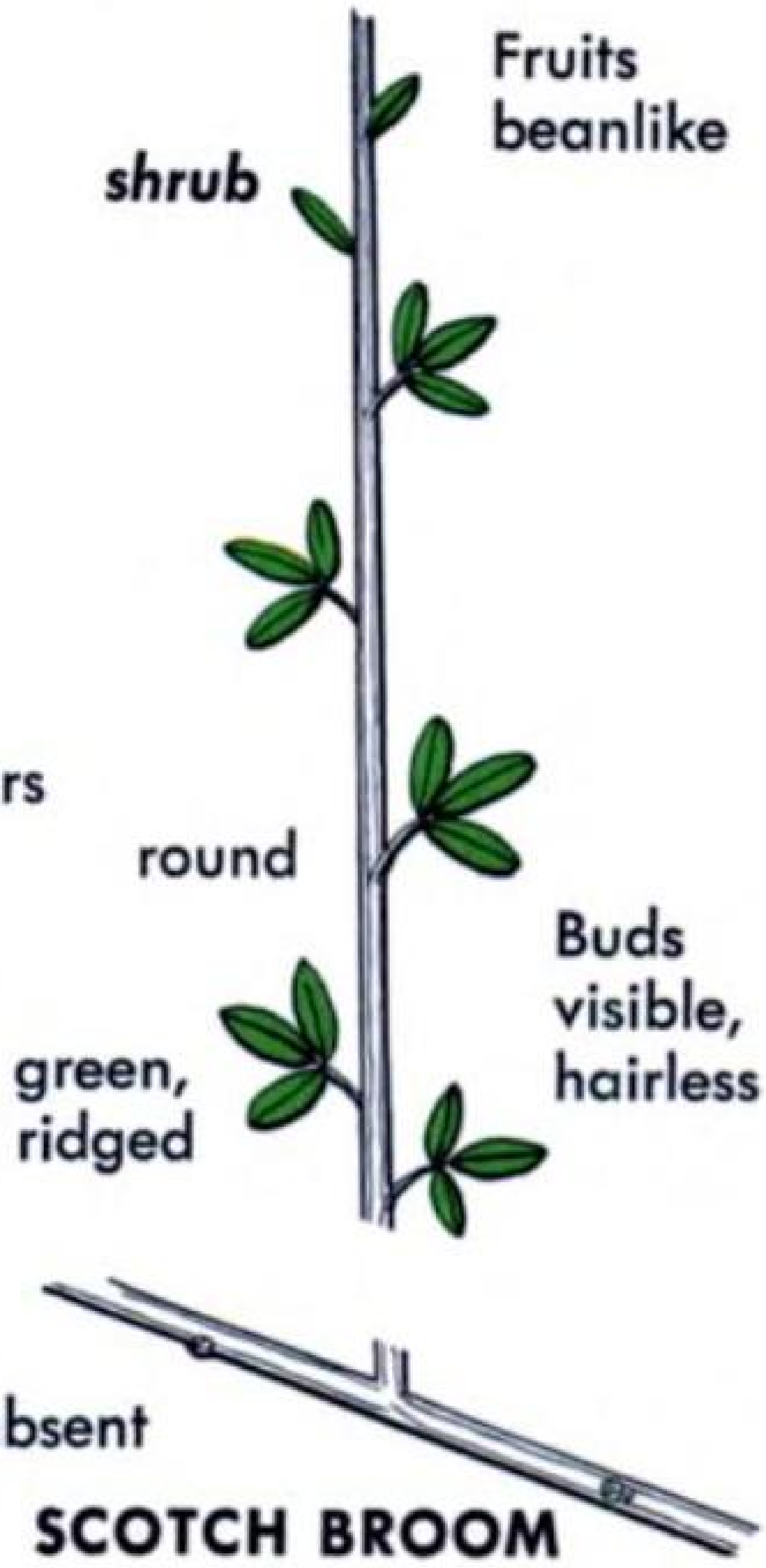
HOPTREE

Leaf scars

Twigs

Aerial roots absent

shrub



Fruits beanlike

round

Buds visible, hairless

green, ridged

SCOTCH BROOM

SUMACS

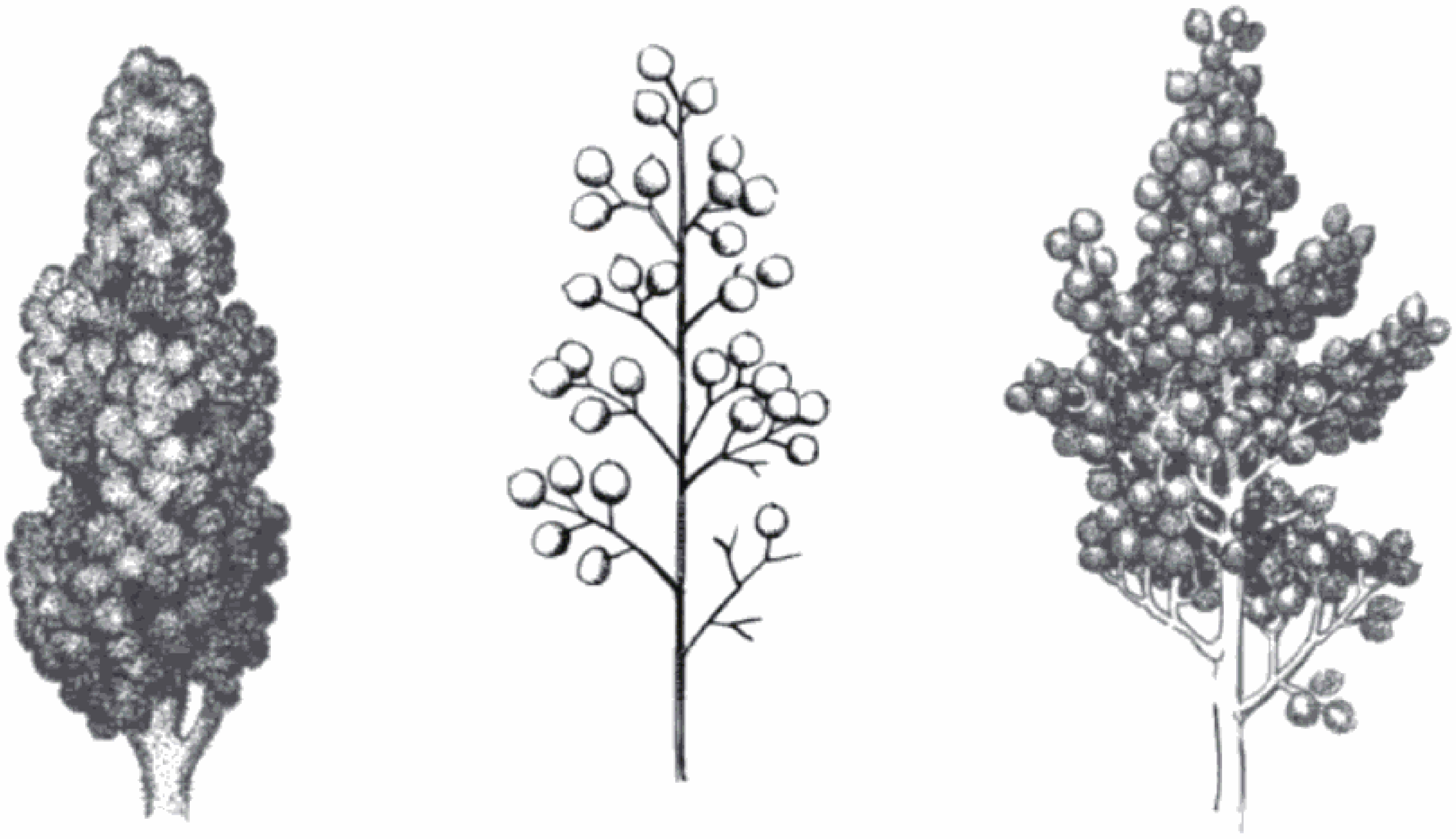
Shrubs or small trees. Feather-compound leaves with 7–31 leaflets. Buds mostly hidden when leaves present. Sap often milky.

↟V WINGED SUMAC, *Rhus copallina* p. 133
Upland fields and openings; s. Maine, se. New York, Michigan, centr. Wisconsin, and e. Kansas to Florida and e. Texas.

↟V STAGHORN SUMAC, *Rhus typhina* p. 134
Upland fields and openings; Nova Scotia, e. Quebec, s. Ontario, and Minnesota to Maryland, n. Georgia, centr. Tennessee, Illinois, and ne. Iowa.

↟V POISON SUMAC, *Rhus vernix* p. 134
Partly wooded swamps; sw. Maine, sw. Quebec, s. Ontario, and se. Minnesota to Florida and Texas.

↟V SMOOTH SUMAC, *Rhus glabra* p. 135
Fields and openings; centr. Maine, sw. Quebec, and s. British Columbia to nw. Florida and s. California.

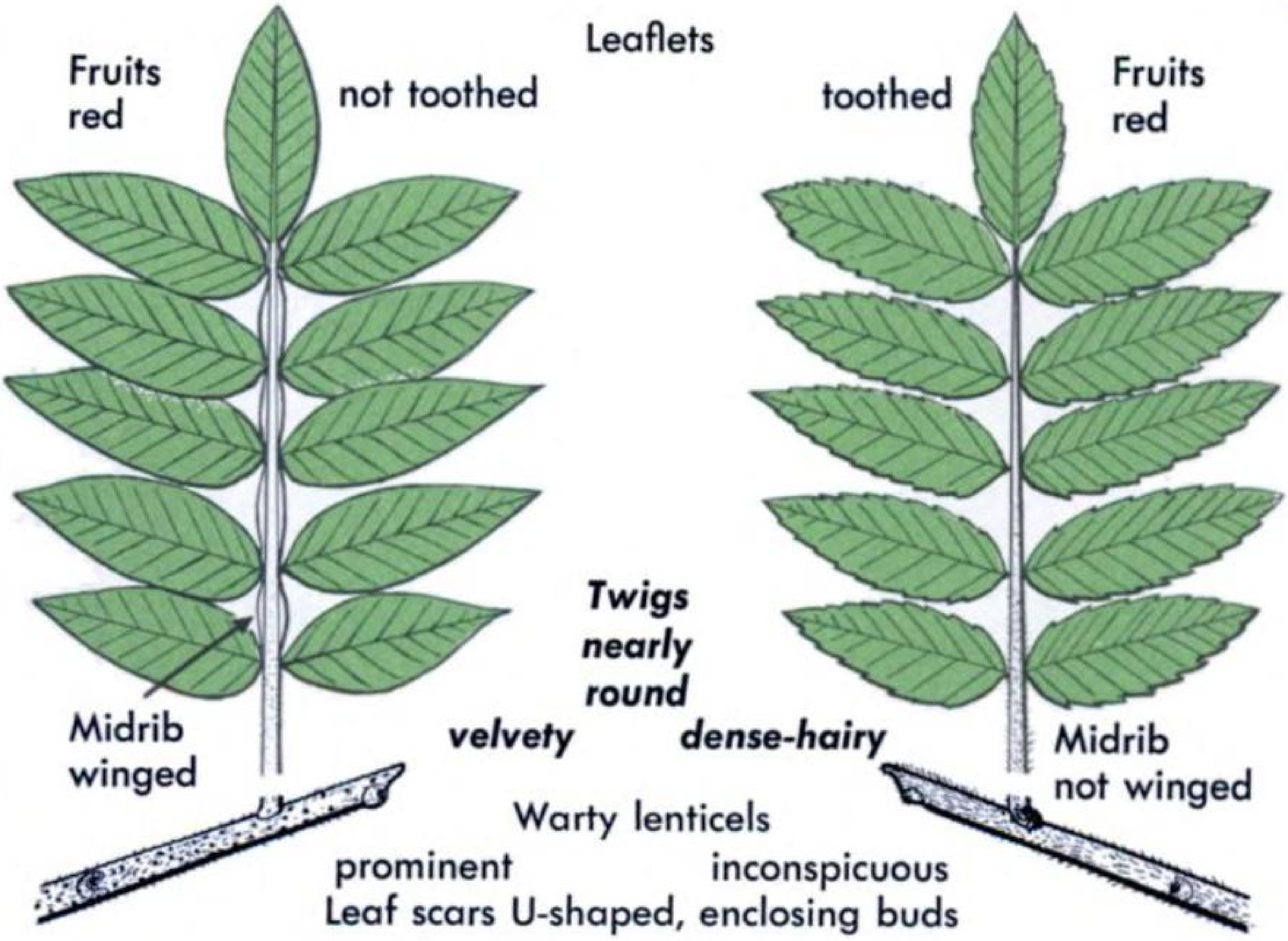


STAGHORN (Red)

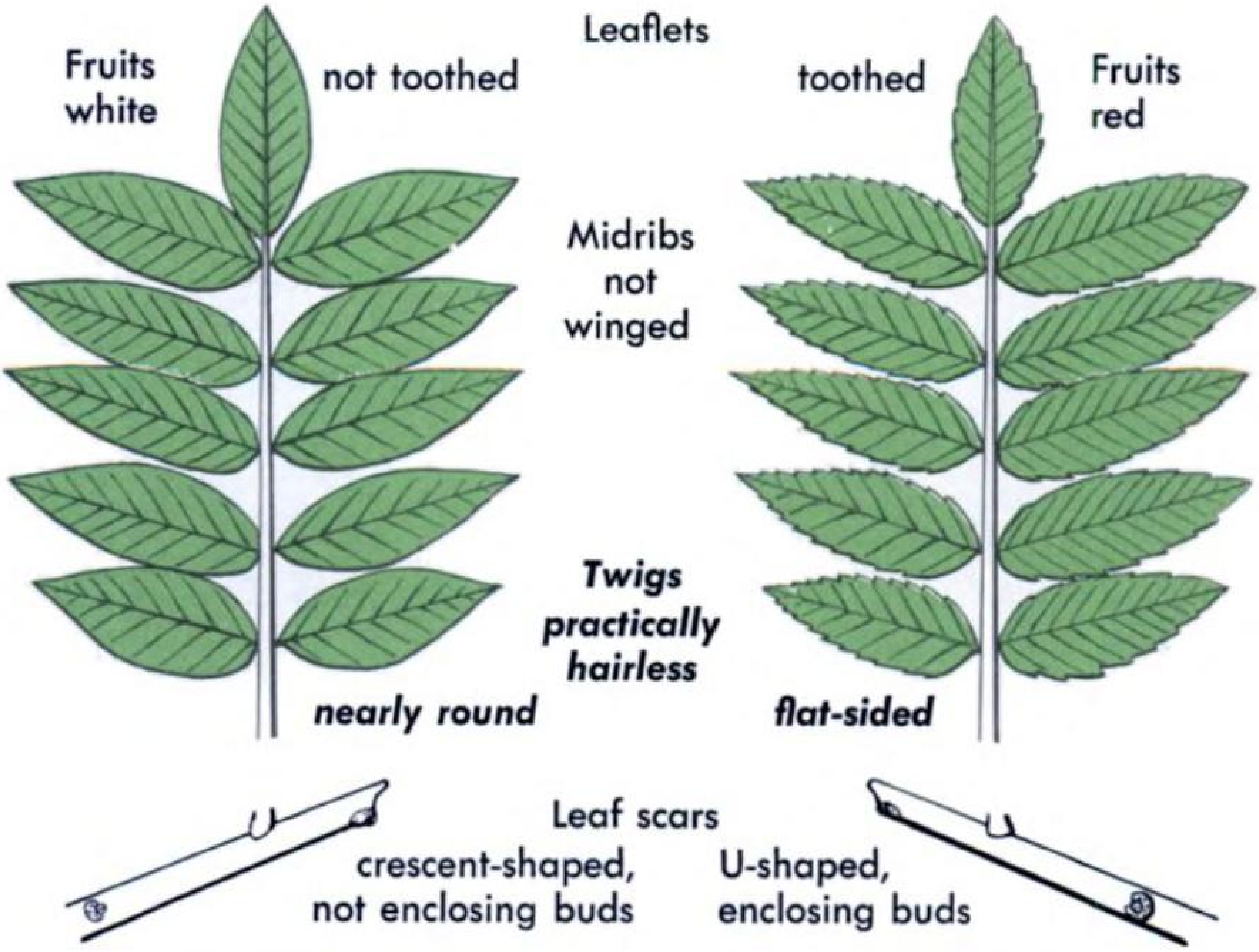
POISON (White)

SMOOTH (Red)

FRUITS OF SUMAC


Fruits red
Leaflets
not toothed
toothed
Fruits red
Twigs nearly round
Midrib winged
velvety
dense-hairy
Midrib not winged
Warty lenticels
prominent
inconspicuous
Leaf scars U-shaped, enclosing buds

WINGED **STAGHORN**


Fruits white
Leaflets
not toothed
toothed
Fruits red
Midribs not winged
Twigs practically hairless
nearly round
flat-sided
Leaf scars
crescent-shaped, not enclosing buds
U-shaped, enclosing buds

POISON **SMOOTH**

WALNUTS AND SIMILAR TREES

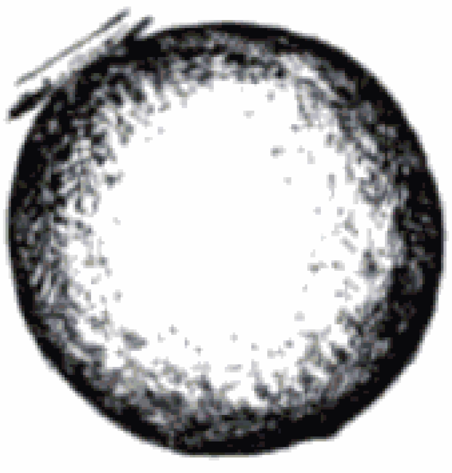
Leaves feather-compound with 7–41 toothed
or glandular leaflets. Buds visible.

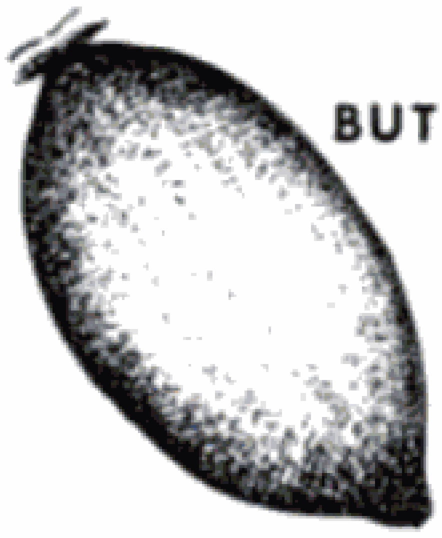
♠ BLACK WALNUT, *Juglans nigra* p. 135
Woods; w. Massachusetts, s. Ontario, s. Minnesota, and se. S. Dakota to nw. Florida, e. Texas, and w. Oklahoma.

♠ BUTTERNUT, *Juglans cinerea* p. 135
Fertile woods; w. New Brunswick, s. Ontario, and se. Minnesota to w. S. Carolina, w. Georgia, n. Mississippi, and n. Arkansas.

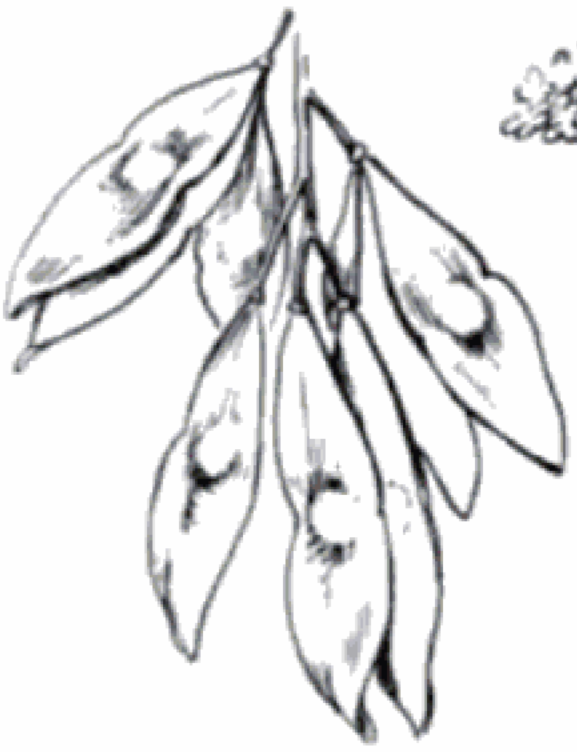
♠ TREE-OF-HEAVEN (AILANTHUS) p. 136
Ailanthus altissima
Imported; waste places, woods, and fields; Massachusetts, s. Ontario, Iowa, and Kansas to Florida and Texas. Local in the West.

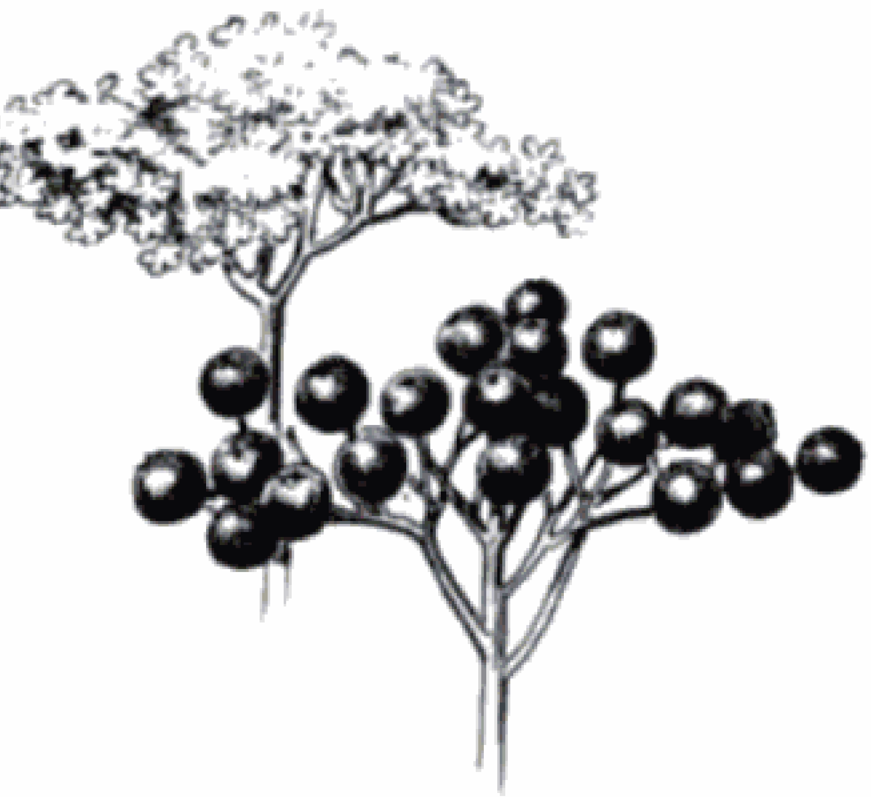
♠ψ AMERICAN MOUNTAIN-ASH, *Pyrus americana* p. 137
Woods and openings; Newfoundland, e. Quebec, n. Michigan, and se. Manitoba to n. New Jersey and n. Illinois; in mts. to w. N. Carolina, e. Tennessee, and n. Georgia.
  ♠ψ NORTHERN MOUNTAIN-ASH p. 137
  P. decora (leaflet illus.)
  ♠ψ EUROPEAN MOUNTAIN-ASH p. 137
  P. aucuparia (not illus.)

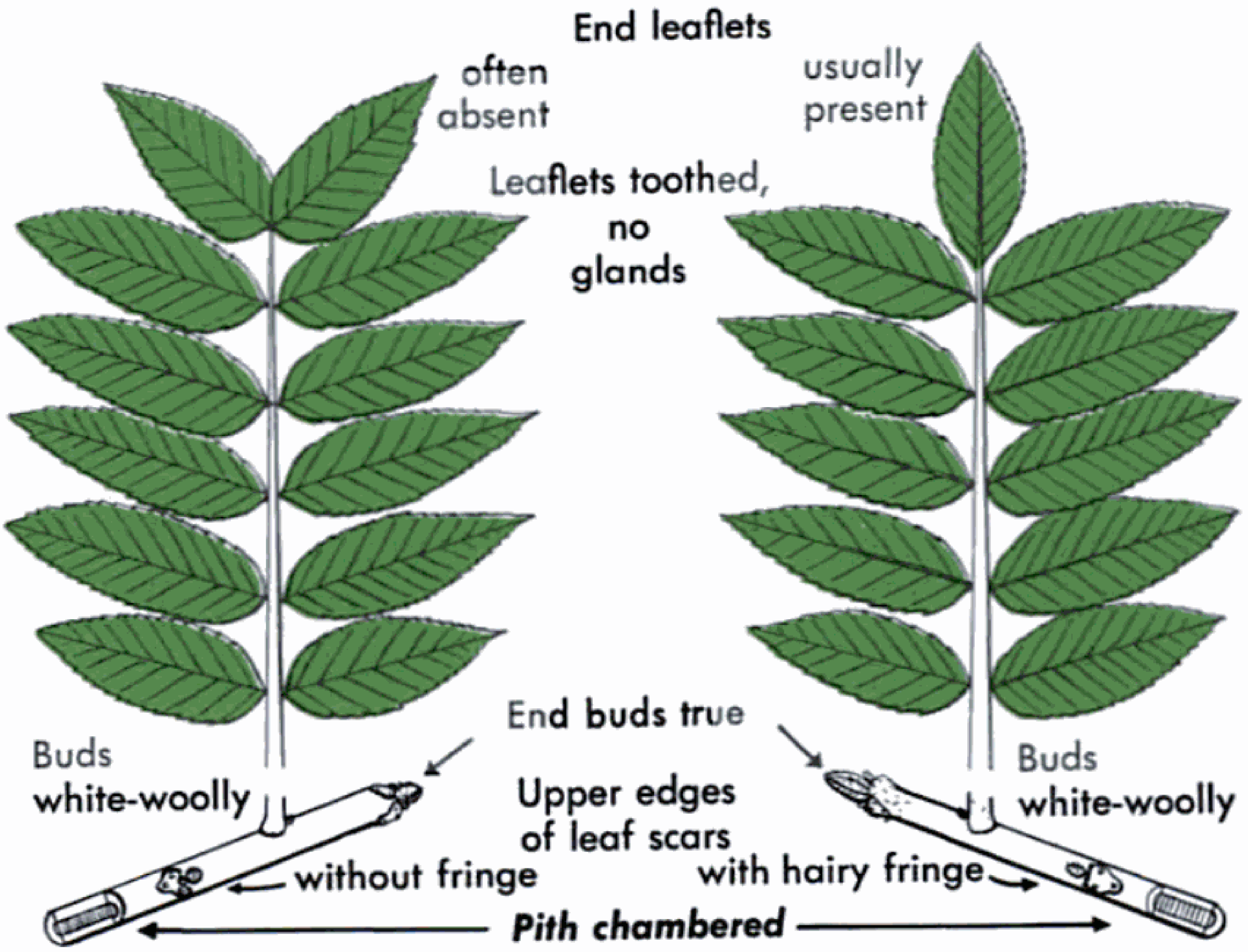

WALNUT


BUTTERNUT

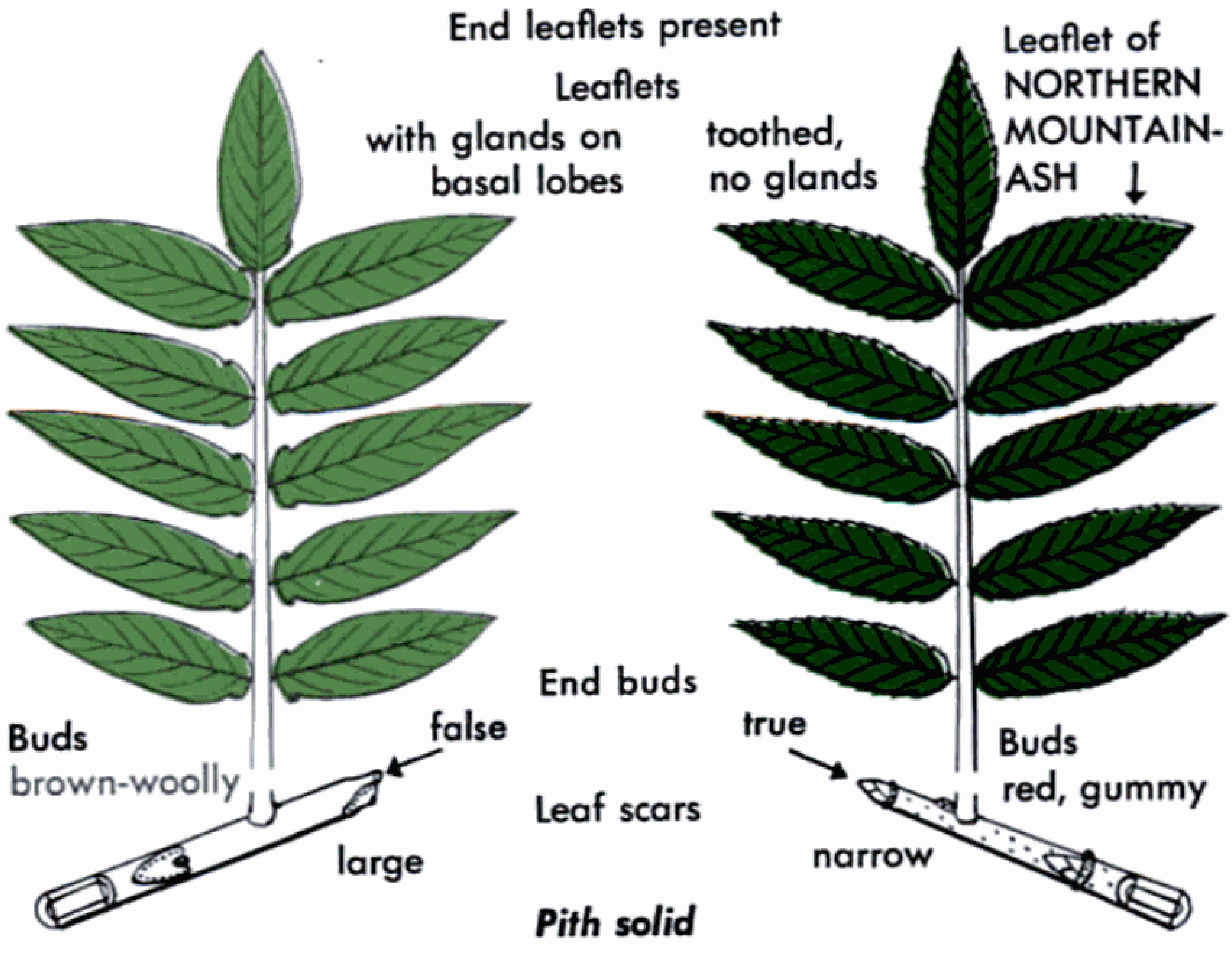
Husks of Walnut and Butternut in one piece (unlike hickories)


TREE-OF-HEAVEN
(Large clusters of winged seeds)


MOUNTAIN-ASH
(Red berries)


End leaflets
often absent
usually present
Leaflets toothed, no glands
End buds true
Buds white-woolly
Upper edges of leaf scars
Buds white-woolly
without fringe
with hairy fringe
Pith chambered

BLACK WALNUT **BUTTERNUT**


End leaflets present
Leaflet of NORTHERN MOUNTAIN-ASH
Leaflets
with glands on basal lobes
toothed, no glands
End buds
false
true
Buds brown-woolly
Buds red, gummy
Leaf scars
large
narrow
Pith solid

TREE-OF-HEAVEN **AMERICAN MOUNTAIN-ASH**

HICKORIES (1)

Trees with feather-compound leaves. Husks of nuts 4-parted.

♠ PECAN, *Carya illinoensis* p. 139
Floodplains; Indiana and Iowa to Alabama and centr. Texas.

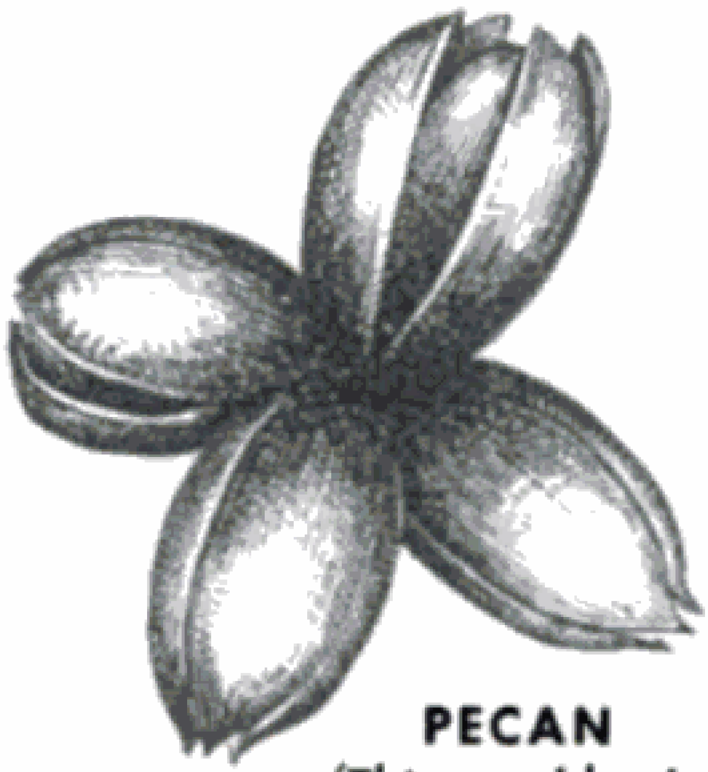
♠ WATER HICKORY (BITTER PECAN) p. 139
Carya aquatica
River swamps of Coastal Plain; se. Virginia to s. Florida, west to e. Texas, and north in Mississippi Valley to sw. Illinois, se. Missouri, and se. Oklahoma.

♠ SHAGBARK HICKORY, *Carya ovata* p. 139
Mature woods and fencerows; sw. Maine, sw. Quebec, s. Ontario, centr. Michigan, se. Minnesota, and se. Nebraska to nw. Florida and e. Texas.

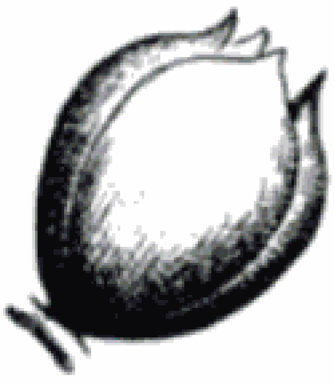
♠ PIGNUT HICKORY, *Carya glabra* p. 140
Dry woods; s. New Hampshire, New York, s. Ontario, s. Michigan, Illinois, and ne. Kansas to Florida, Louisiana, and Arkansas.

♠ SWEET PIGNUT HICKORY, *C. ovalis* (fruit illus.) p. 140
Moist or dry woods; sw. New Hampshire, s. Ontario, Wisconsin, and Iowa to Georgia, Mississippi, and Arkansas.

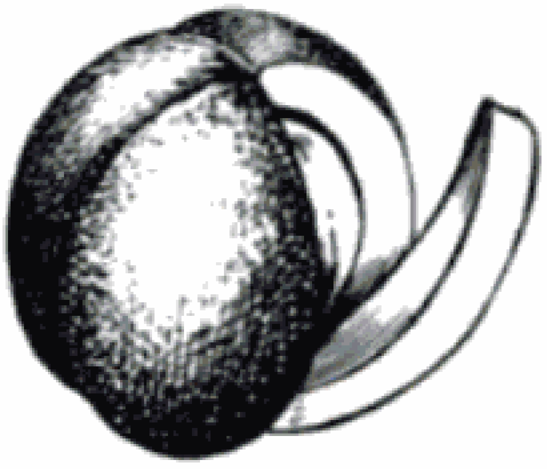
♠ BLACK HICKORY, *C. texana* (not illus.) p. 141
Dry woods; s. Indiana, s. Illinois, Missouri, and e. Kansas to Louisiana and s. Texas.



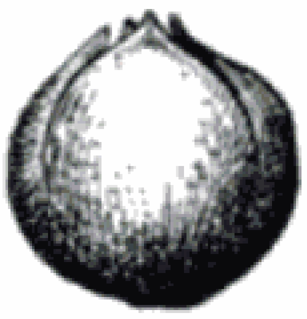
PECAN
(Thin oval husk, smooth brown nut)



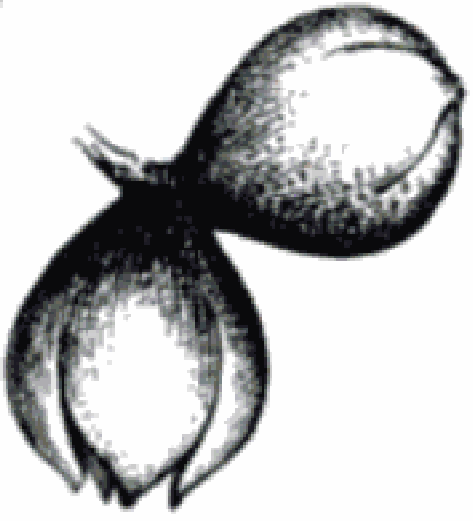
WATER
(Thin husk, bitter soft-shelled nut)



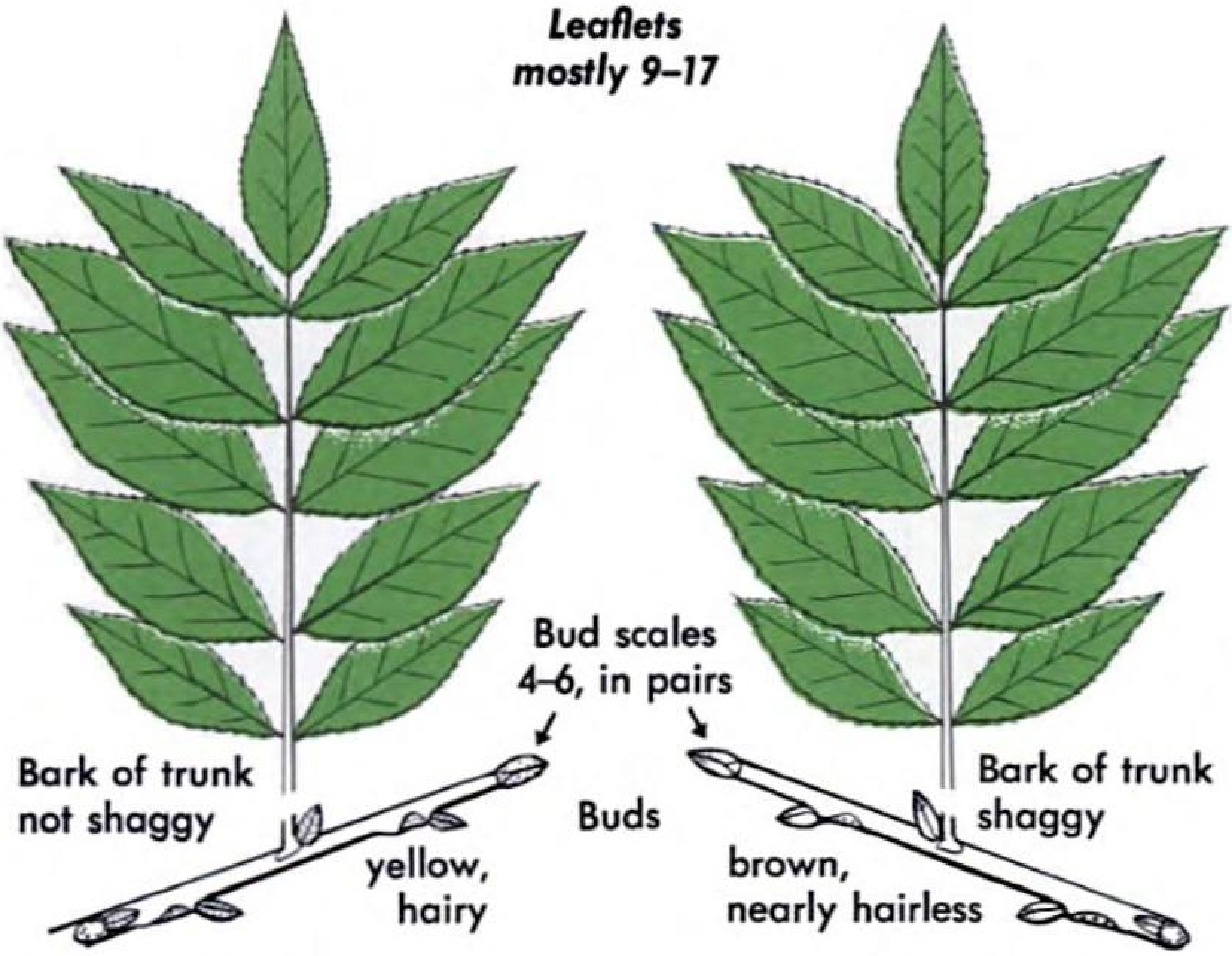
SHAGBARK
(Thick-walled husk)



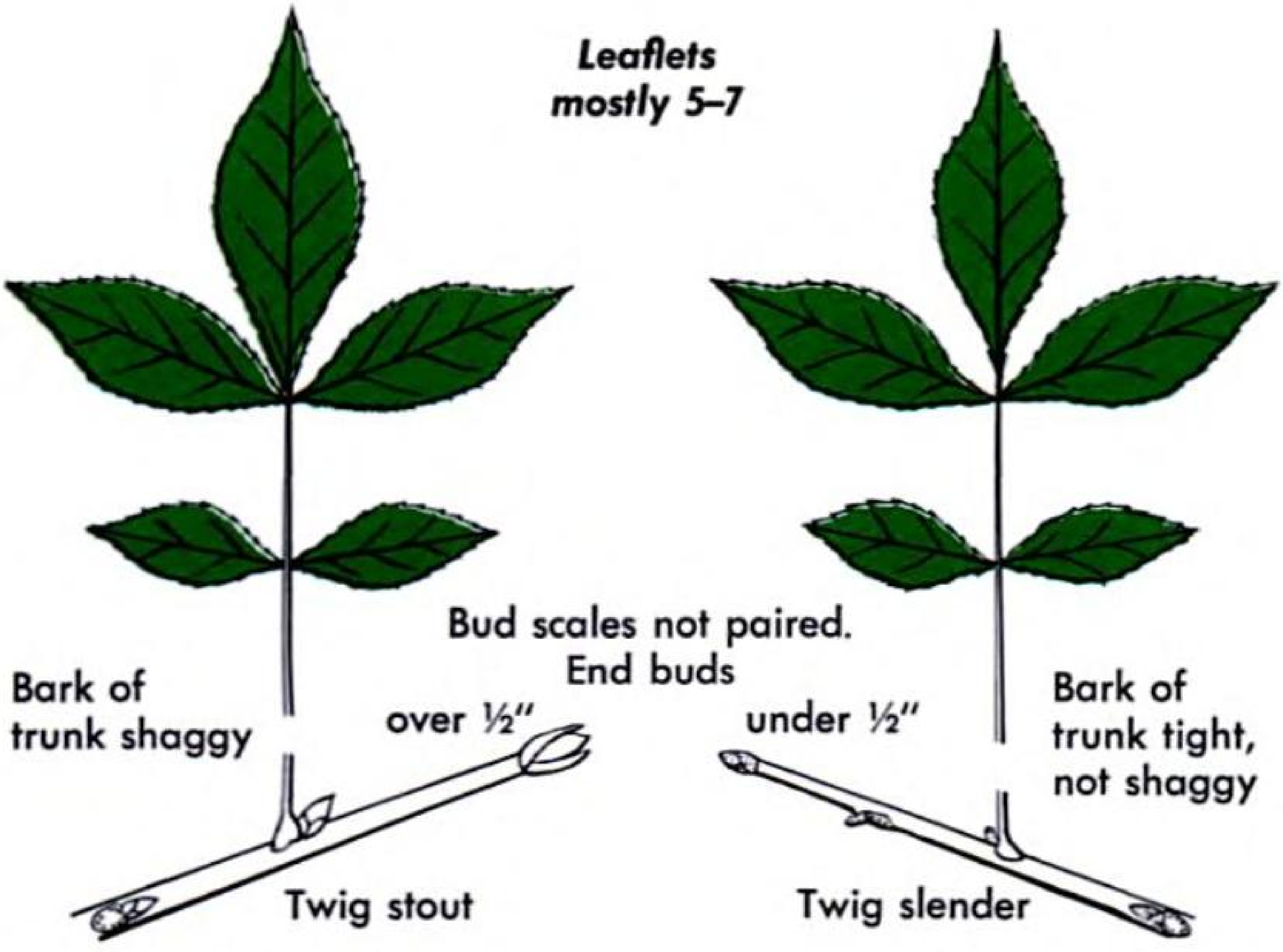
SWEET PIGNUT
(Thin husk, sweet kernels)



PIGNUT
(Thin husk may not split to base)


Leaflets mostly 9–17
Bud scales 4–6, in pairs
Bark of trunk not shaggy
Buds
yellow, hairy
brown, nearly hairless
Bark of trunk shaggy

PECAN **WATER**


Leaflets mostly 5–7
Bud scales not paired.
End buds
over ½″
under ½″
Bark of trunk shaggy
Bark of trunk tight, not shaggy
Twig stout
Twig slender

SHAGBARK **PIGNUT**

HICKORIES (2)

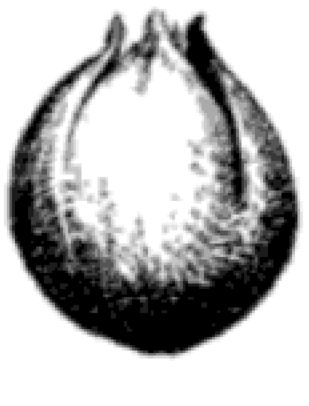
Trees with feather-compound leaves. Husks of nuts 4-parted.

♠ BITTERNUT HICKORY, *Carya cordiformis* p. 141
Woods; New Hampshire, sw. Quebec, s. Ontario, Michigan, Minnesota, and se. Nebraska to nw. Florida and Texas.

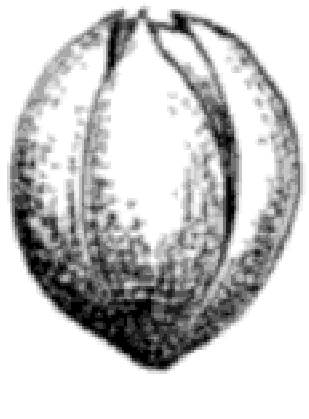
♠ PALE HICKORY, *Carya pallida* p. 141
Coastal Plain woods; s. New Jersey, N. Carolina, and Tennessee to Florida and Louisiana.

♠ MOCKERNUT HICKORY, *Carya tomentosa* p. 141
Upland woods; s. New Hampshire, New York, s. Ontario, s. Michigan, se. Iowa, and Nebraska to n. Florida and e. Texas.

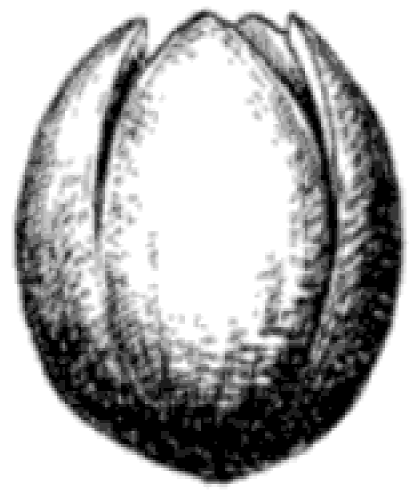
♠ SHELLBARK HICKORY, *Carya laciniosa* p. 142
Bottomlands and rich soils; w. New York, s. Ontario, s. Michigan, s. Iowa, and e. Kansas to Virginia, w. N. Carolina, n. Georgia, Alabama, Louisiana, and e. Kansas.



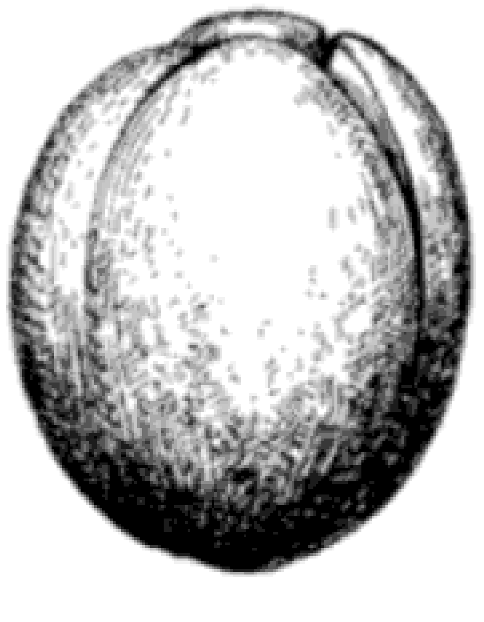
BITTERNUT
(Bitter kernels)



PALE
(Sweet kernels)



MOCKERNUT
(Fruits large,
husks not splitting
to base)



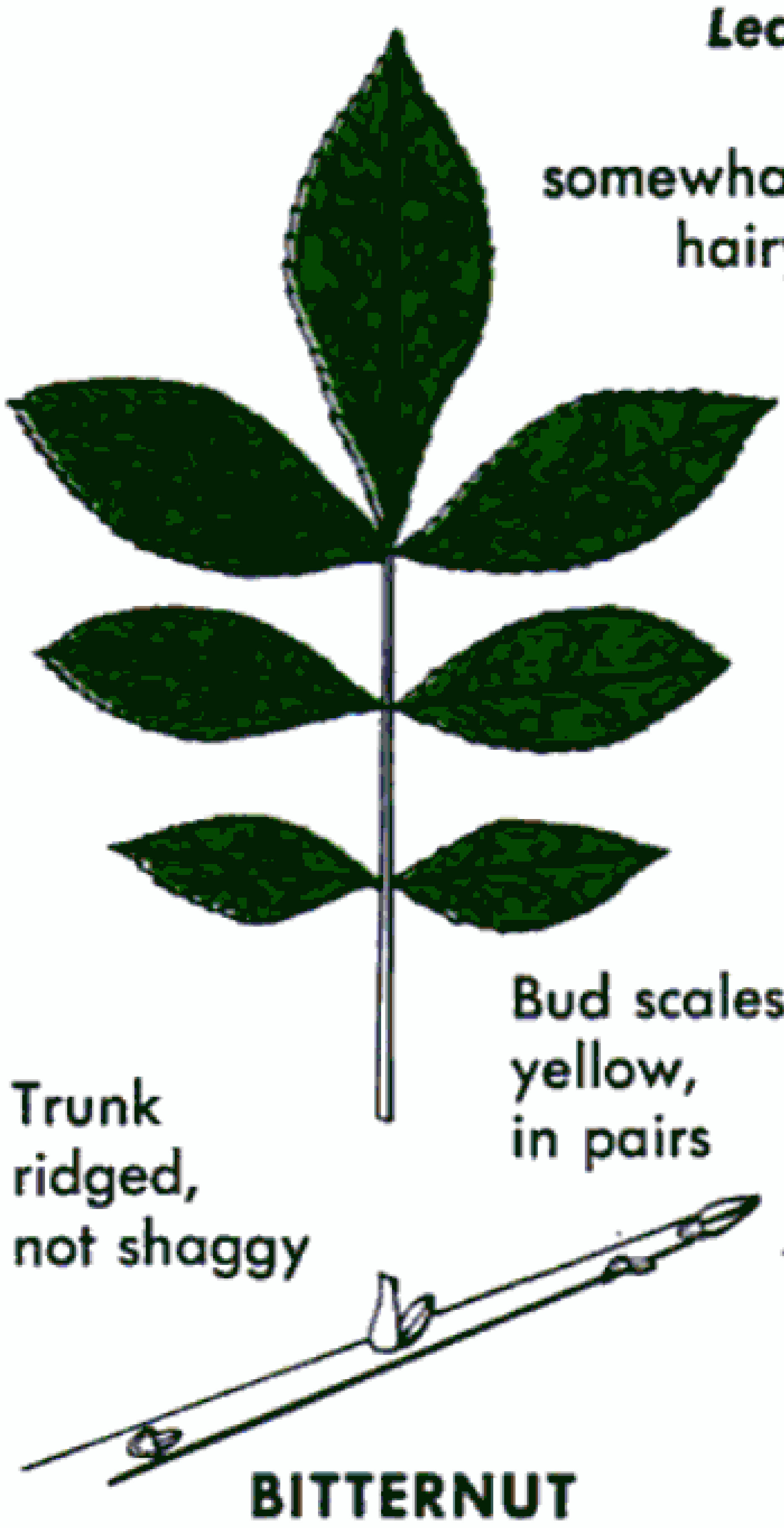
SHELLBARK
(Fruits large, husks
splitting to base)

Leaflets mostly 7–9

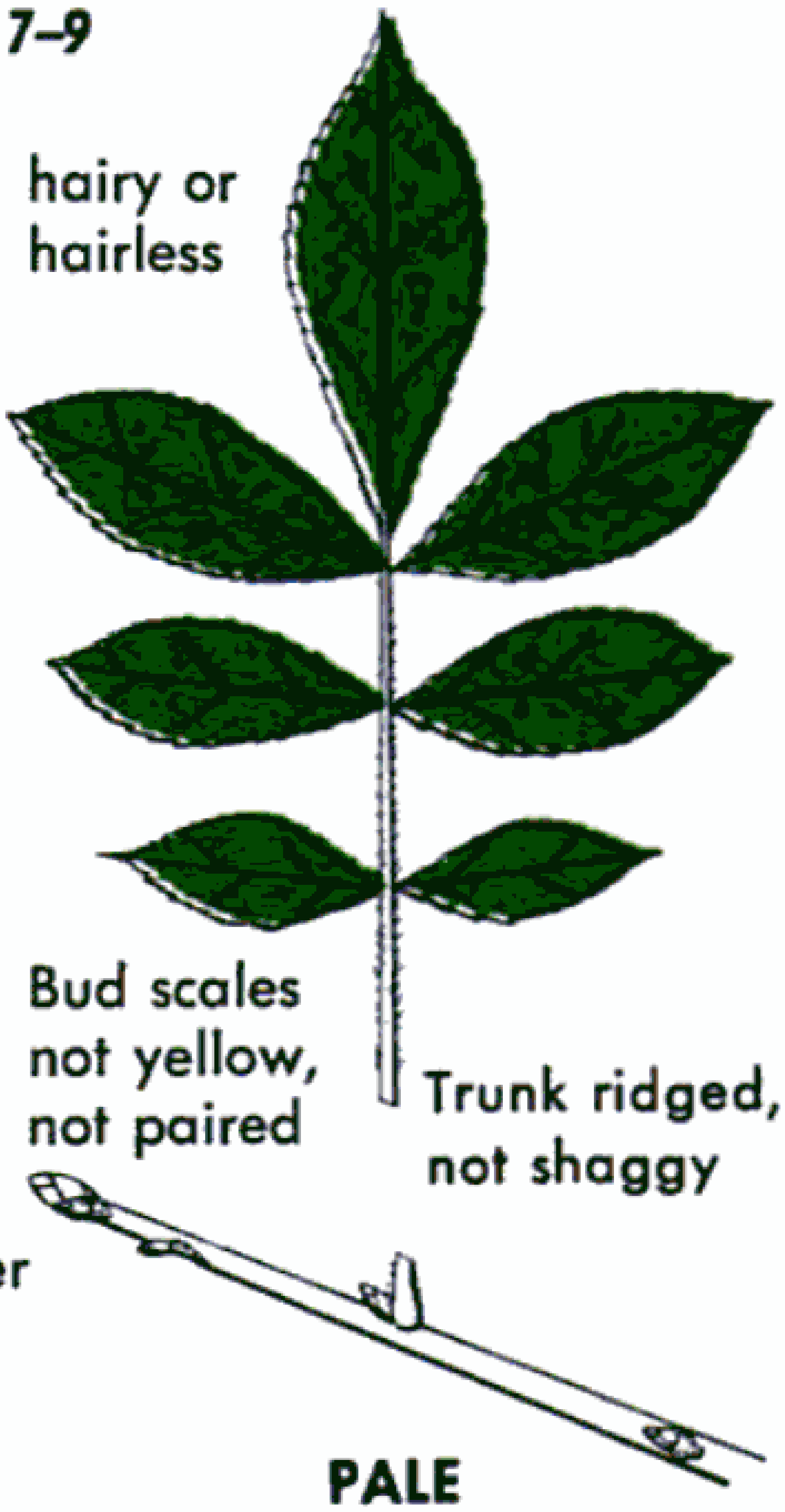
Undersides

End buds under ½″

Twigs slender


somewhat hairy
Bud scales yellow, in pairs
Trunk ridged, not shaggy

BITTERNUT


hairy or hairless
Bud scales not yellow, not paired
Trunk ridged, not shaggy

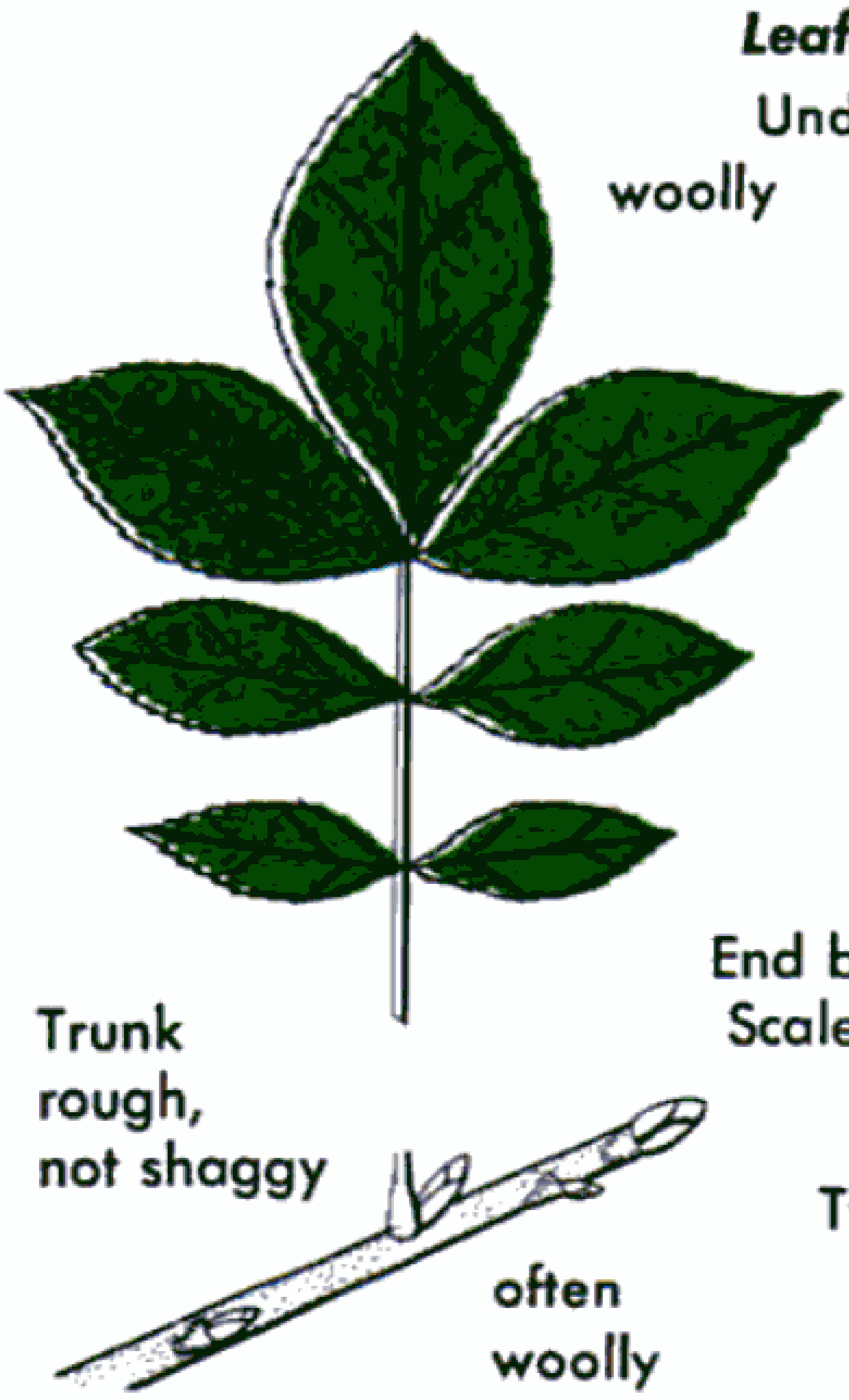
PALE

Leaflets mostly 7–9

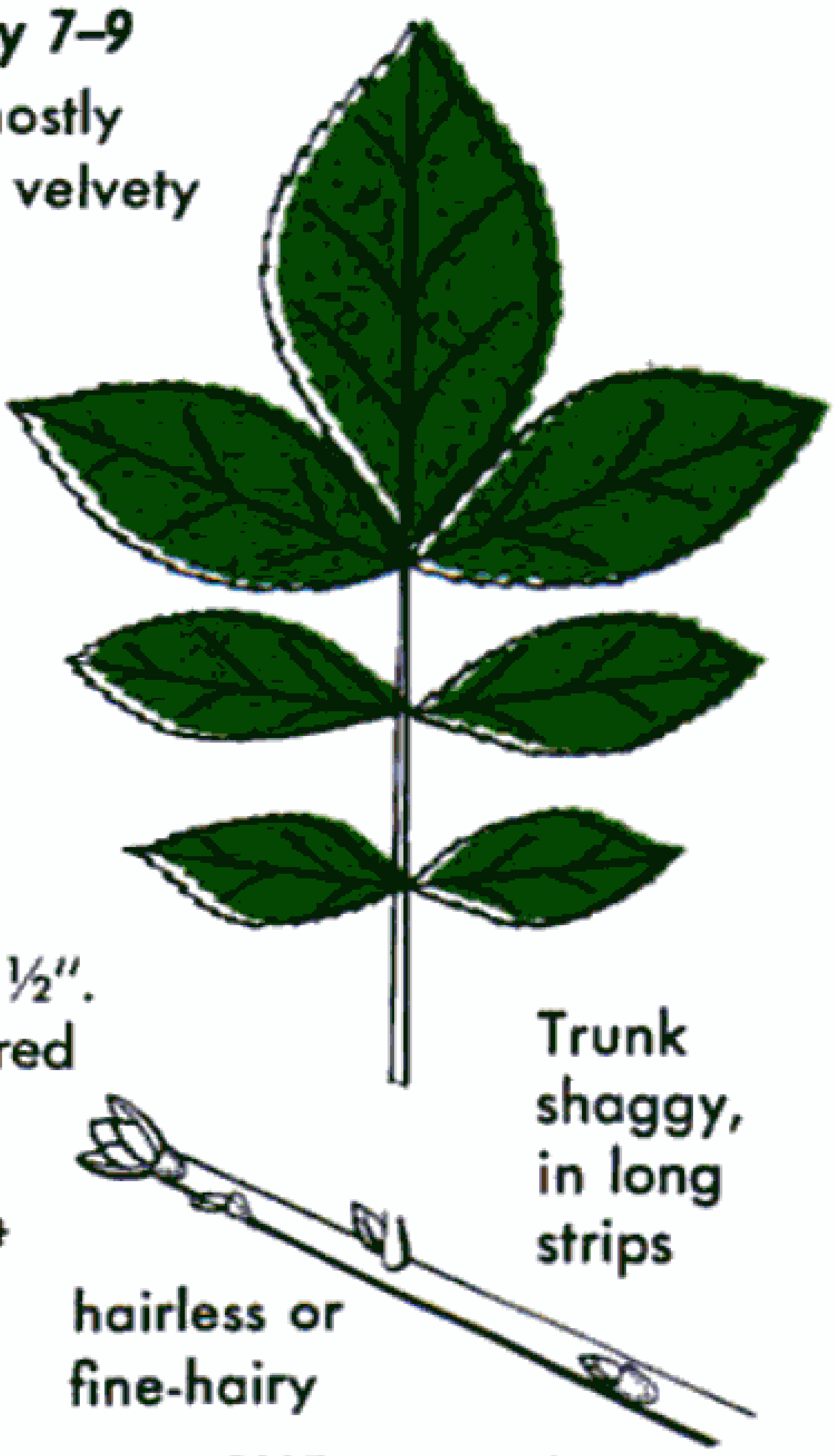
Undersides mostly

End buds over ½″. Scales not paired

Twigs stout


woolly
Trunk rough, not shaggy
often woolly

MOCKERNUT


velvety
Trunk shaggy, in long strips
hairless or fine-hairy

SHELLBARK

MISCELLANEOUS SPECIES

with alternate once-compound leaves.

⬆ YELLOWWOOD, *Cladrastis lutea* p. 142
Rich soils; w. N. Carolina, s. Indiana, and s. Illinois to n. Georgia and n. Alabama, also in sw. Missouri, nw. Arkansas, and ne. Oklahoma; sometimes spreading from cultivation farther north.

V BLADDER-SENNA, *Colutea arborescens* (not illus.) p. 143

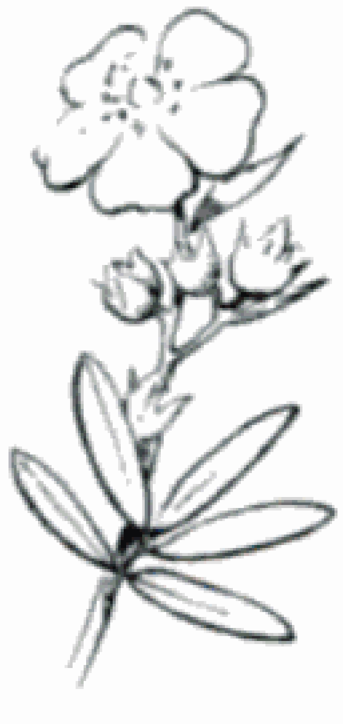
V SHRUBBY CINQUEFOIL, *Potentilla fruticosa* p. 143
Meadows and bogs; Newfoundland, s. Labrador, and Alaska to n. New Jersey, n. Pennsylvania, n. Illinois, n. Iowa, S. Dakota, New Mexico, and California.

V DULL-LEAF INDIGOBUSH, *Amorpha fruticosa* p. 143
Fertile soils; New England, New York, s. Michigan, Manitoba, and Saskatchewan to n. Florida, Mexico, and Arizona.
V DOWNY INDIGOBUSH, *A. canesceas* (leaflet illus.) p. 144
V FRAGRANT INDIGOBUSH, *A. nana* (leaflet illus.) p. 144
For other indigobushes see pages 143–44.

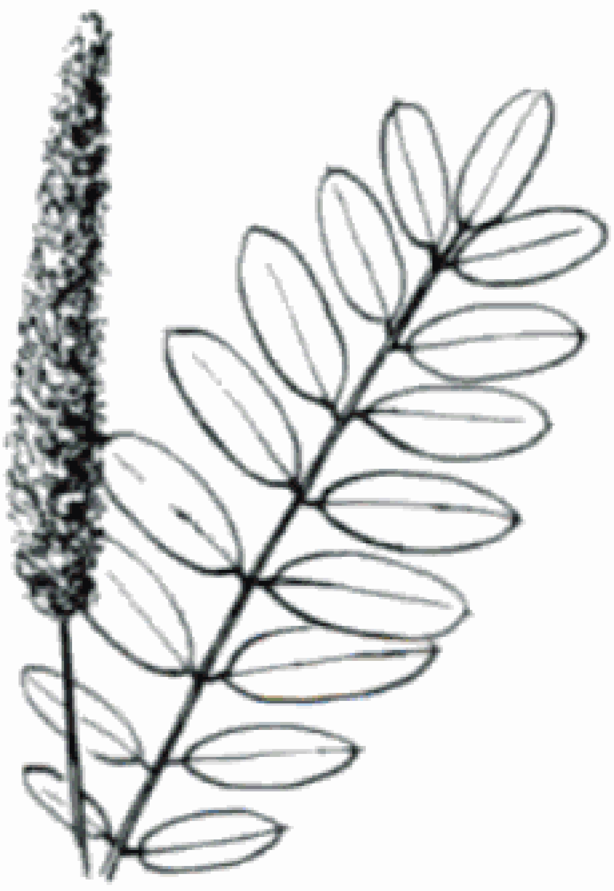
ʃ VIRGINIA CREEPER, *Parthenocissus quinquefolia* p. 144
Woods and thickets; se. Maine, sw. Quebec, and Minnesota to Florida and Mexico.
ʃ THICKET CREEPER, *P. inserta* (tendrils illus.) p. 144

ʃ AMERICAN WISTERIA, *Wisteria frutescens* p. 145
Floodplains and streambanks; e. Maryland and se. Virginia to Florida and Alabama.
For other wisterias see page 145.

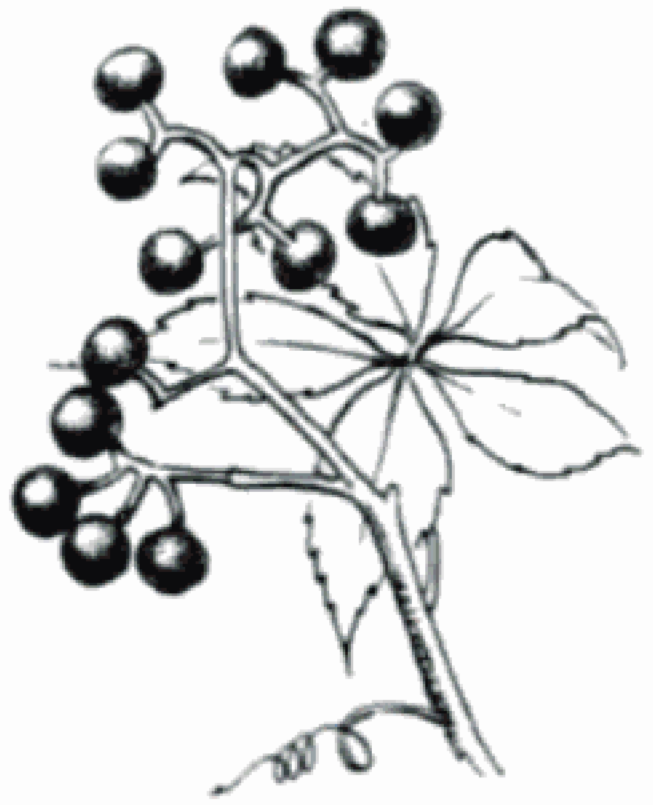
⬆ WESTERN SOAPBERRY p. 145
Sapindus drummondi (not illus.)



SHRUBBY CINQUEFOIL



INDIGOBUSH

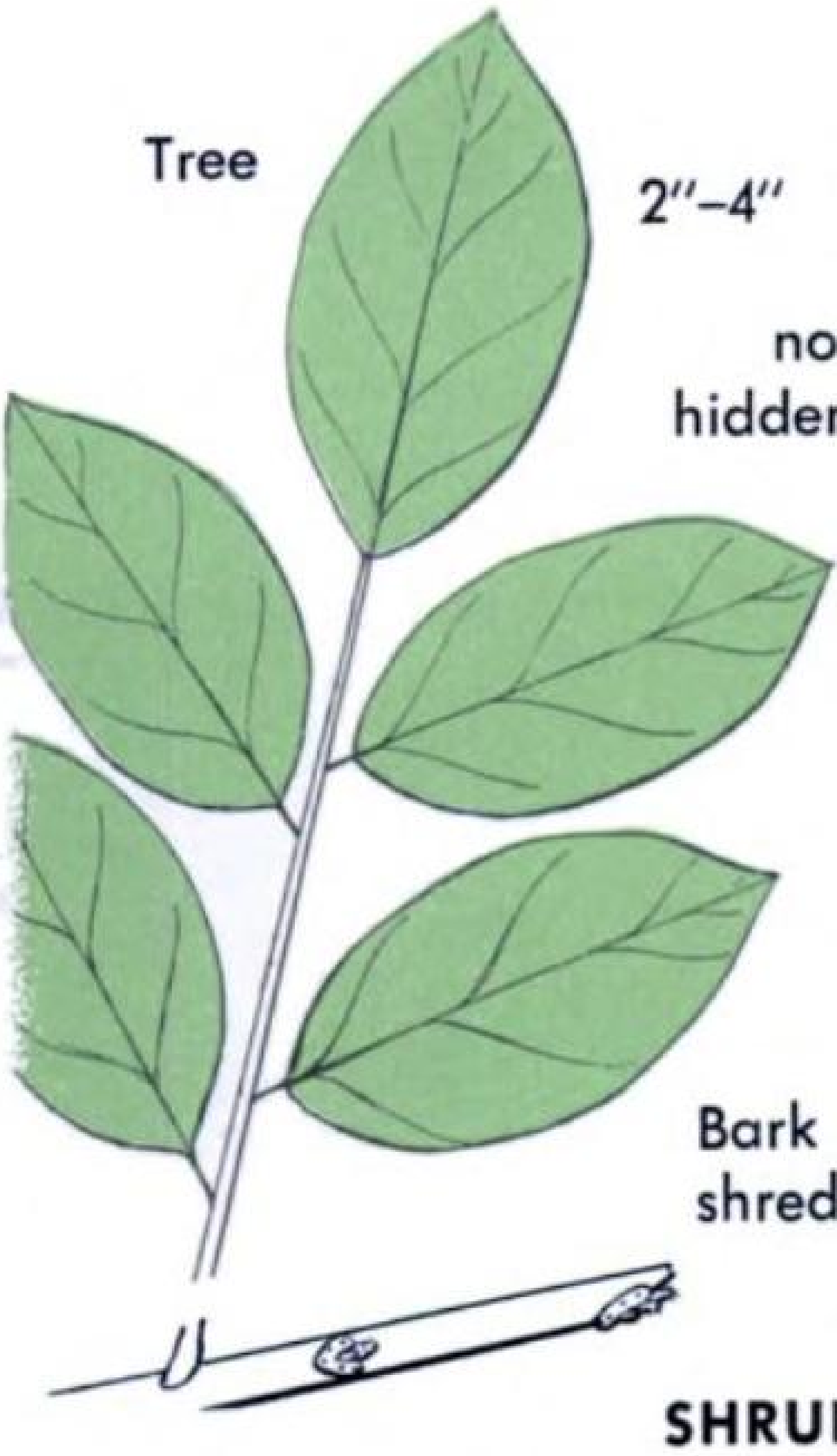


VIRGINIA CREEPER

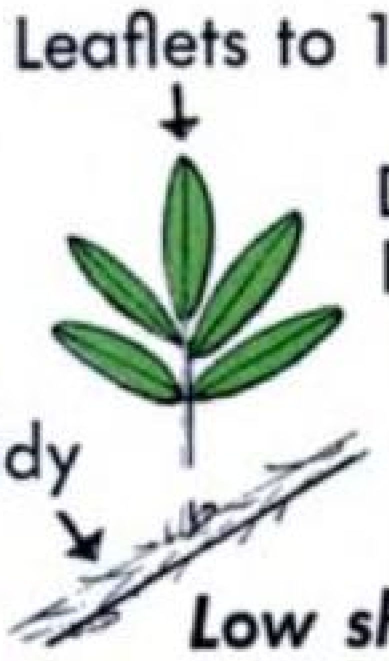
Erect plants

Leaflets

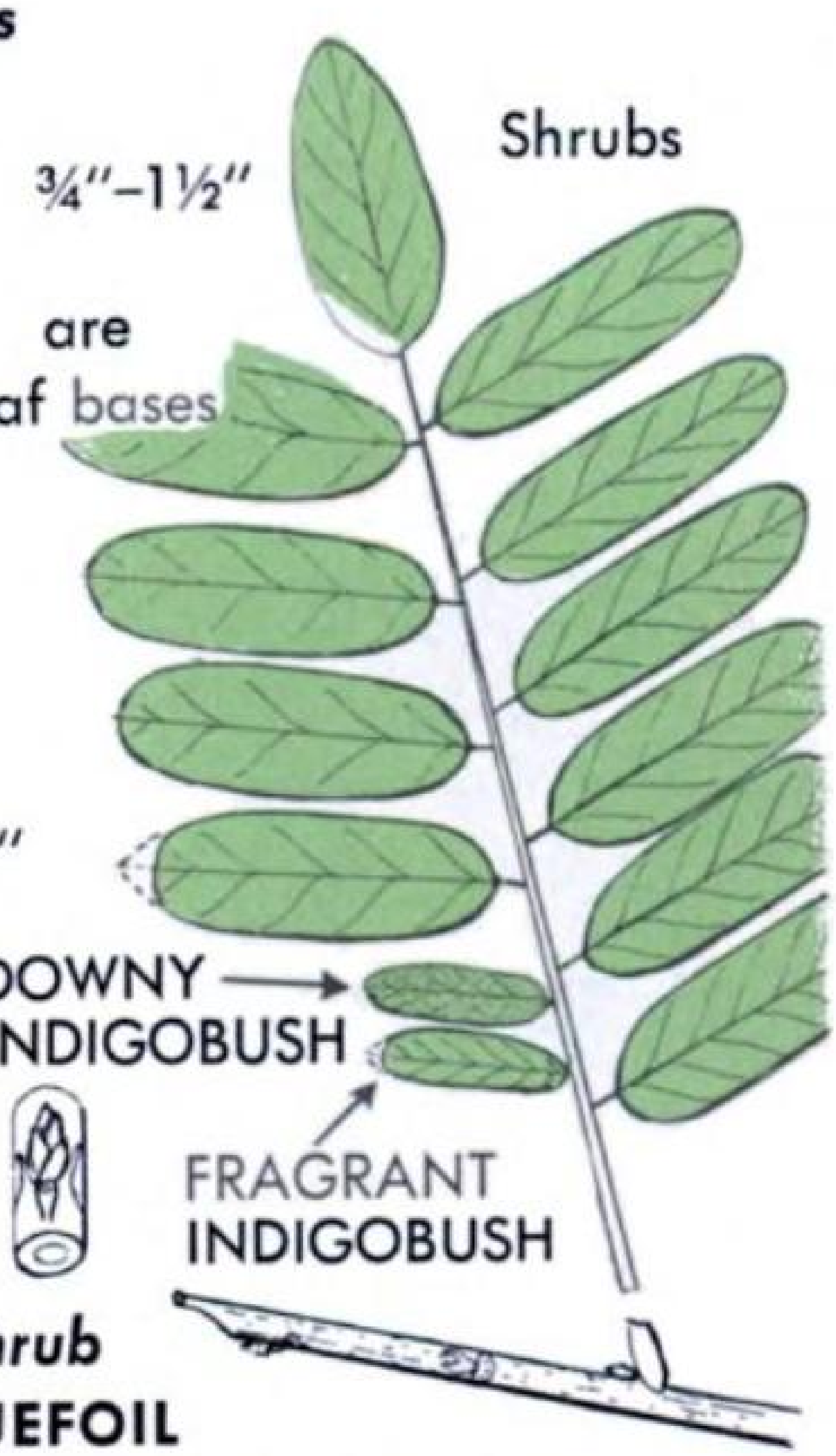
Buds


Tree
2″–4″
not hidden beneath leaf bases

YELLOWWOOD

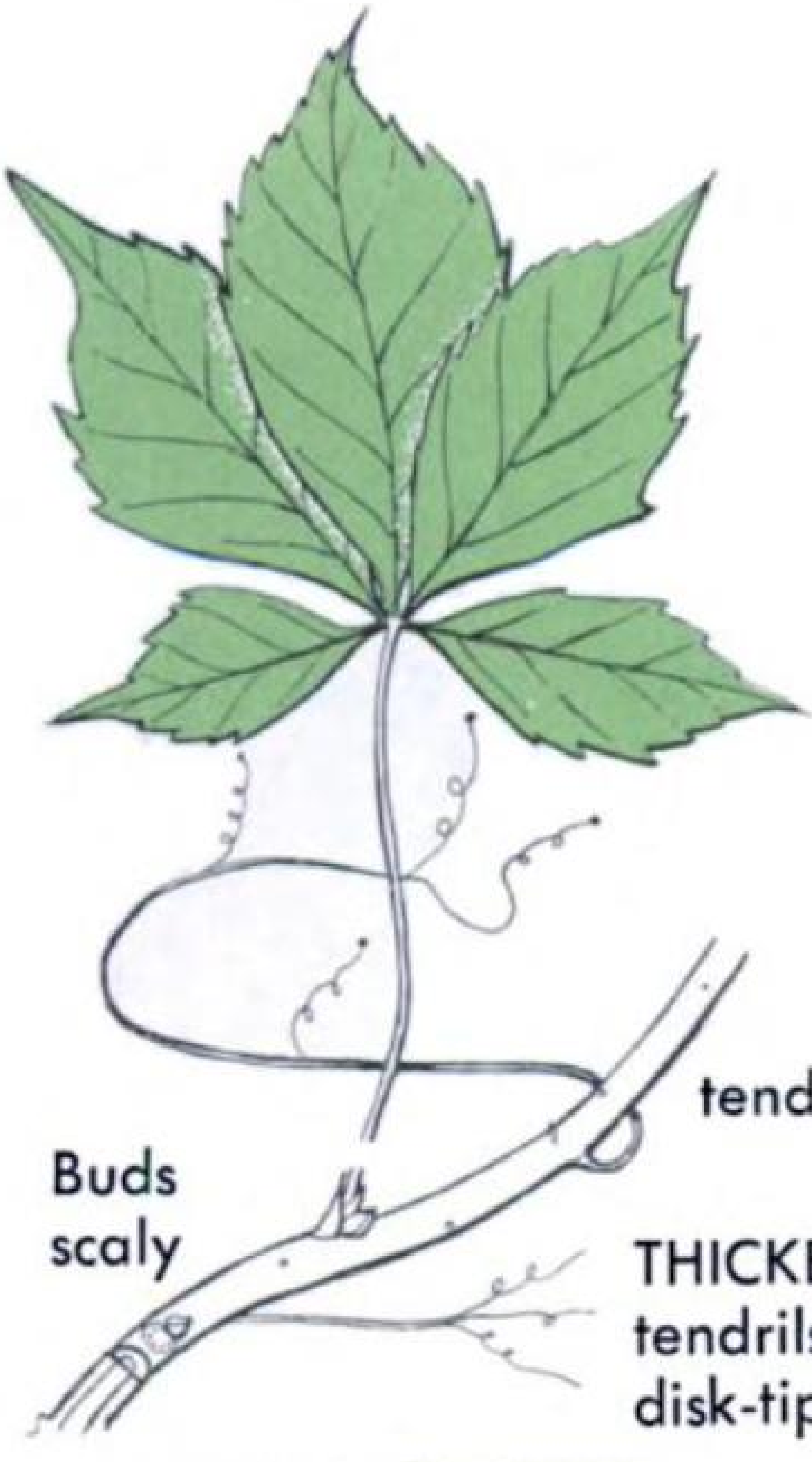

Leaflets to 1″
Bark shreddy
Low shrub

SHRUBBY CINQUEFOIL

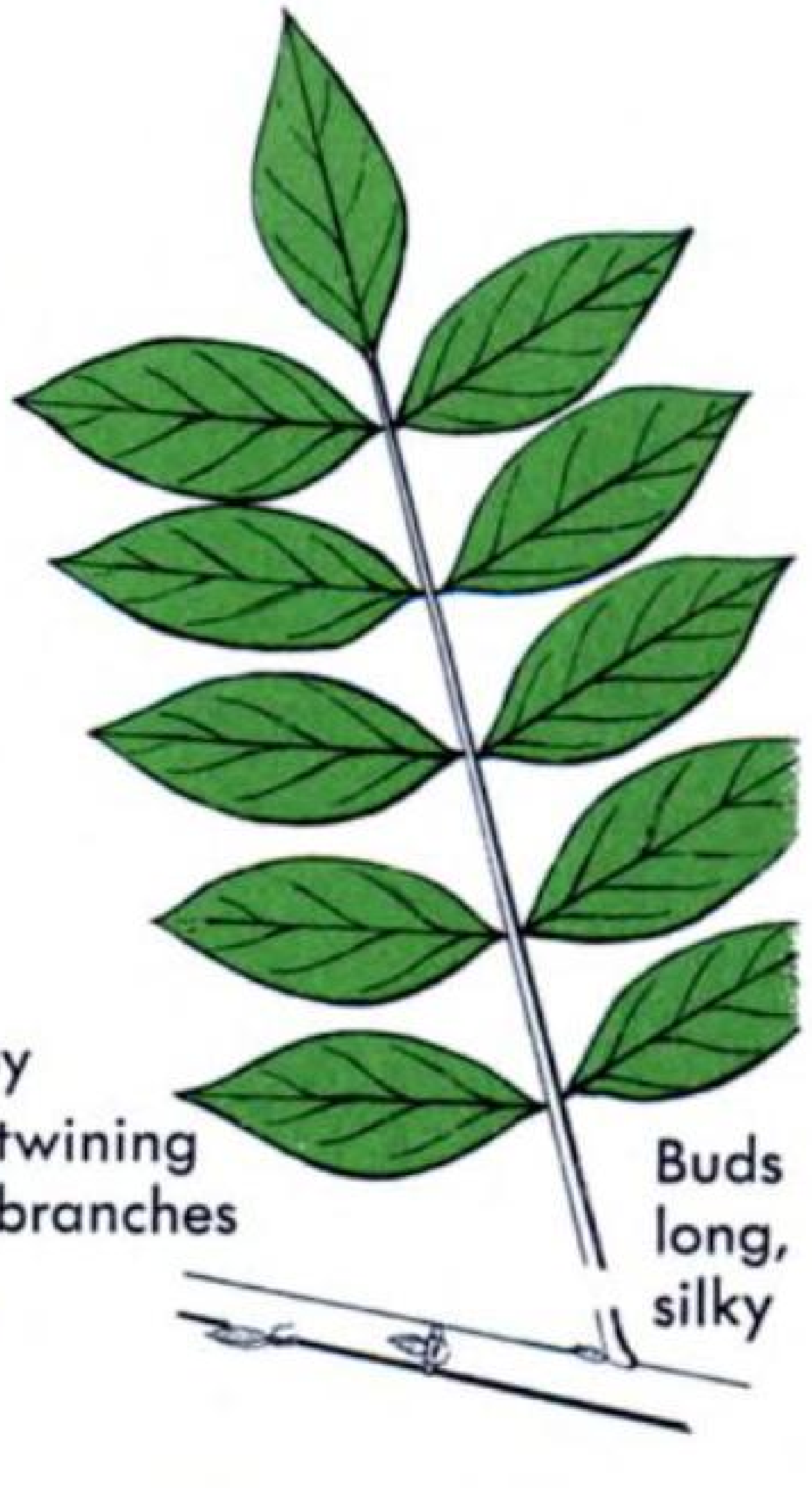

Shrubs
¾″–1½″
are
DOWNY INDIGOBUSH
FRAGRANT INDIGOBUSH

DULL-LEAF INDIGOBUSH

Vines


climbing by
tendrils
Buds scaly
THICKET CREEPER tendrils not disk-tipped

VIRGINIA CREEPER


twining branches
Buds long, silky

AMERICAN WISTERIA

THORNLESS PLANTS WITH LEAVES TWICE-COMPOUND

Only these thornless plants and 2 spiny species on Plate 24 have compound leaves whose *leaflets* are also compound.

Ѵ YELLOWROOT, *Xanthorhiza simplicissima* p. 146
Floodplains and wet woods; sw. New York to Florida and Alabama.

ʃ PEPPER VINE,° *Ampelopsis arborea* p. 146
Wet woods; e. Maryland, W. Virginia, s. Illinois, Missouri, and Oklahoma to Florida and Texas.

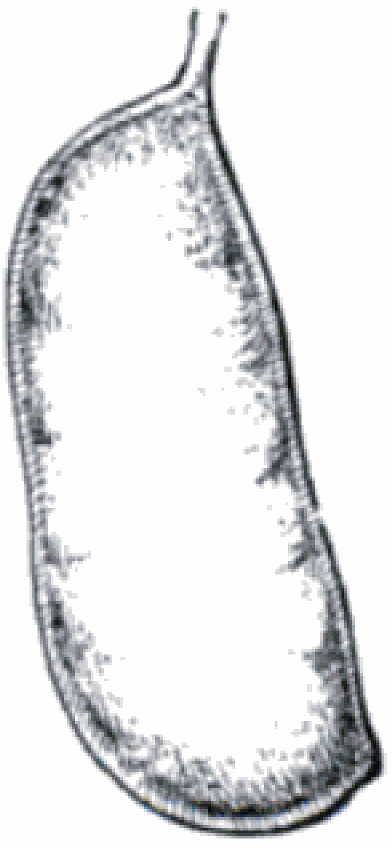
♠ CHINABERRY, *Melia azedarach* (not illus.) p. 147
Oriental; planted e. Virginia and se. Oklahoma to Florida and centr. Texas.

♠ COFFEE-TREE, *Gymnocladus dioica* p. 147
Fertile woods; centr. New York, s. Ontario, s. Michigan, and se. S. Dakota to Virginia, Tennessee, and w. Oklahoma.

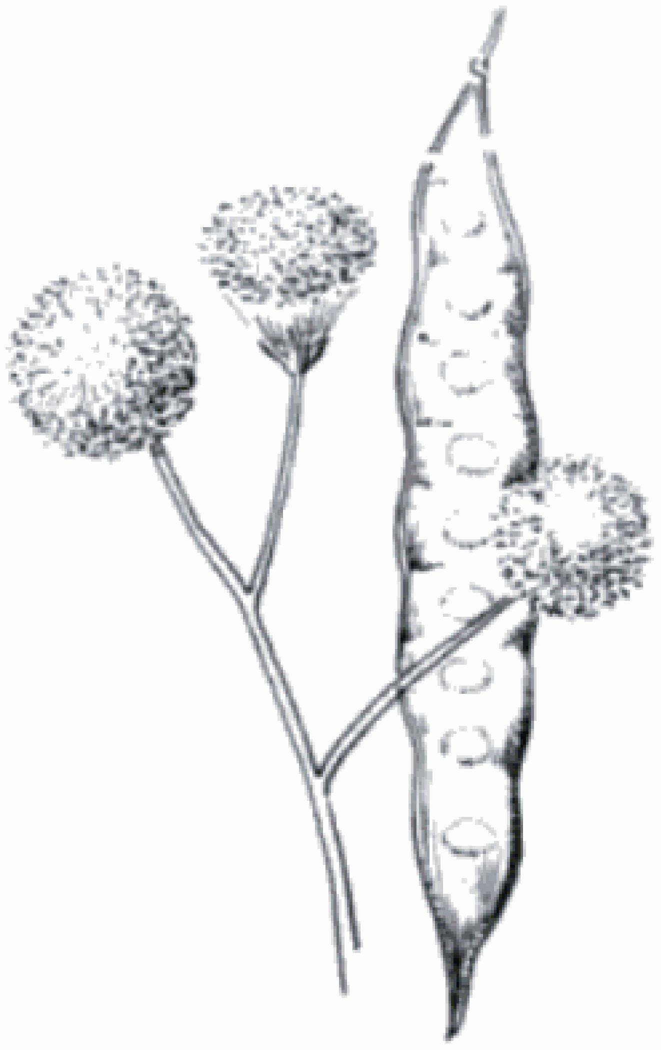
♠ ALBIZZIA, *Albizzia julibrissin* p. 147
Asiatic; escaped to woods and thickets; Maryland and Indiana to Florida and Louisiana.

Ѵ PRAIRIE ACACIA p. 148
Acacia angustissima var. *hirta* (not illus.)

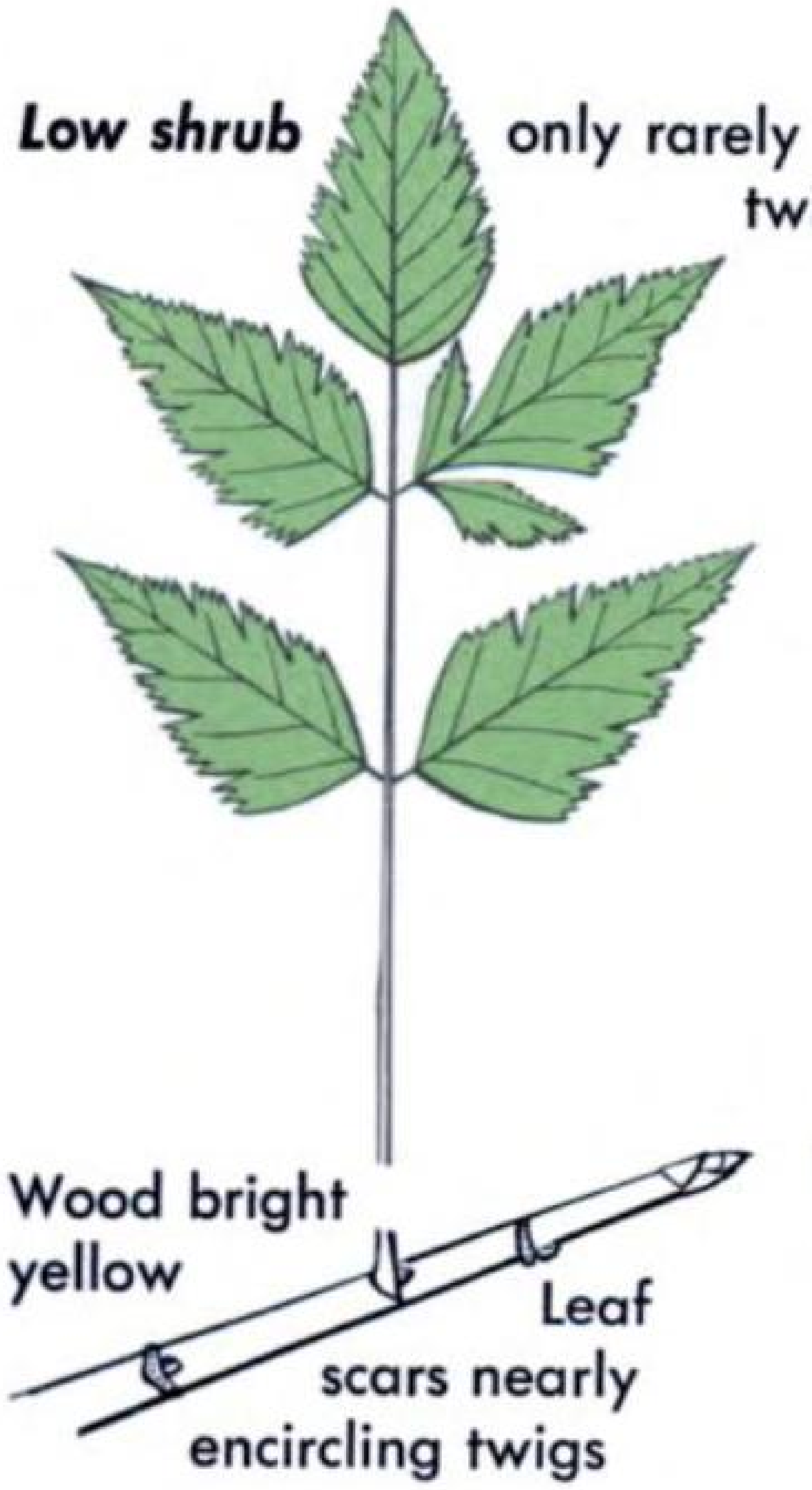
° May be either a vine or a shrub.



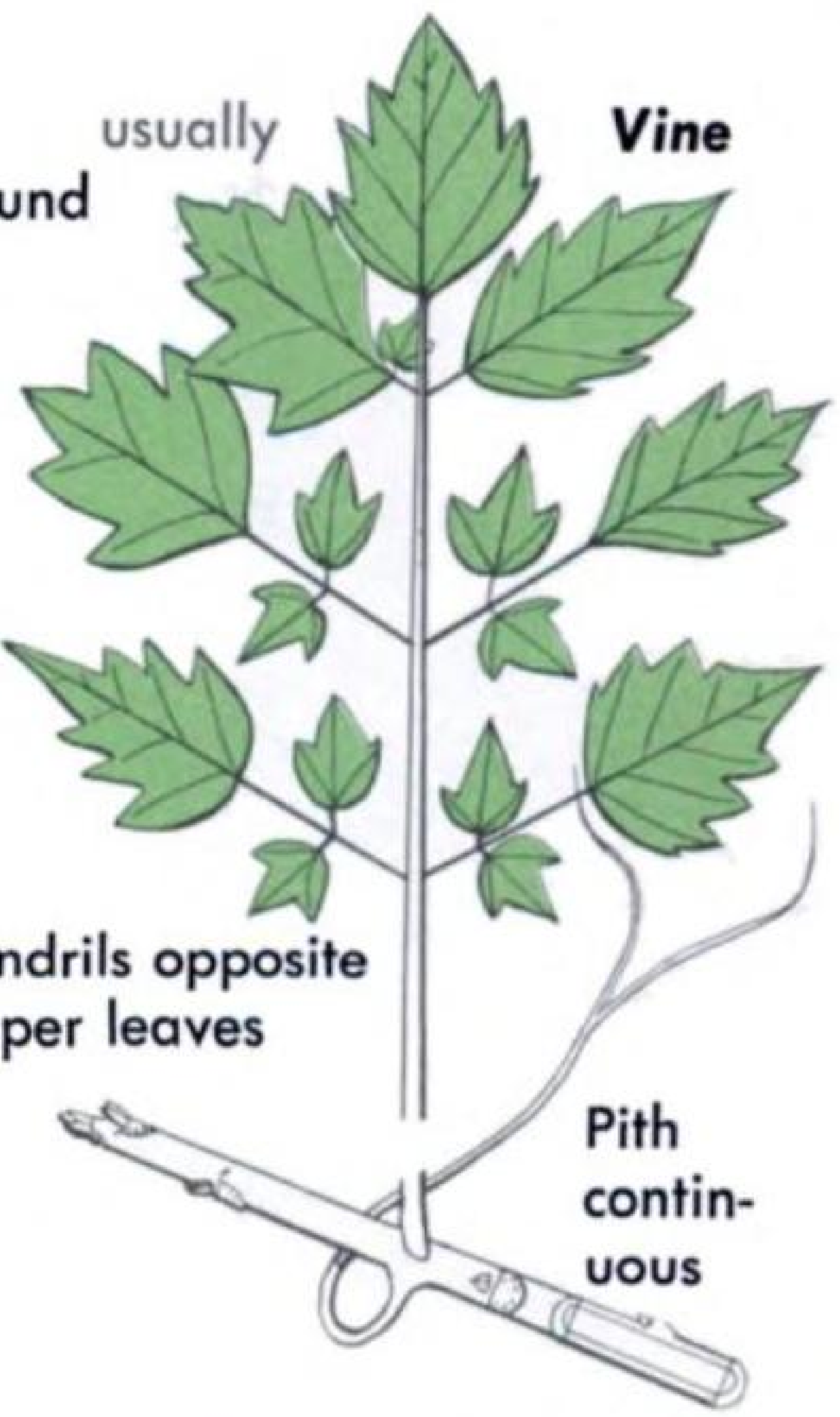
COFFEE-TREE



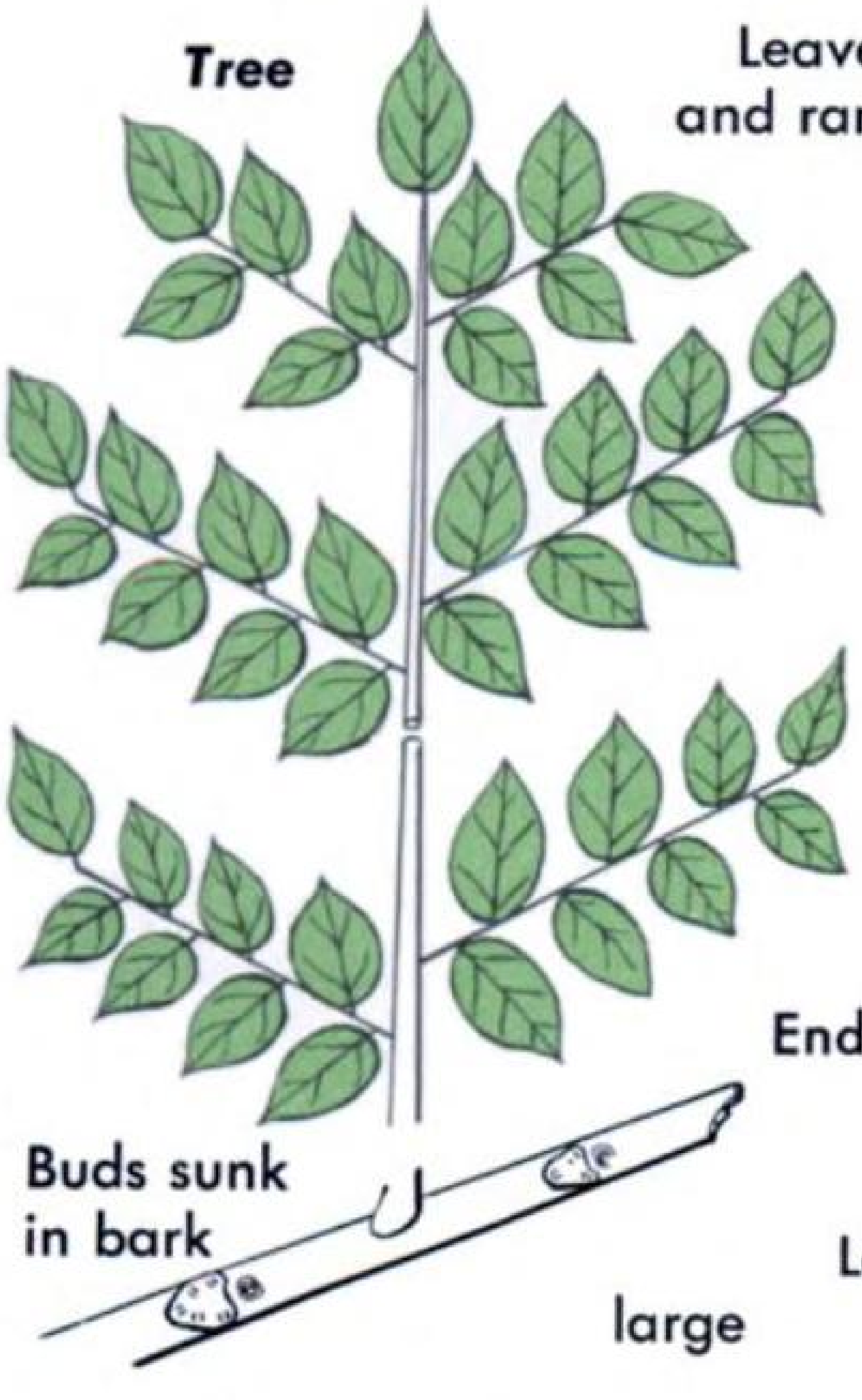
ALBIZZIA


Low shrub
Leaves
only rarely
twice-compound
Wood bright yellow
Leaf scars nearly encircling twigs
End buds true

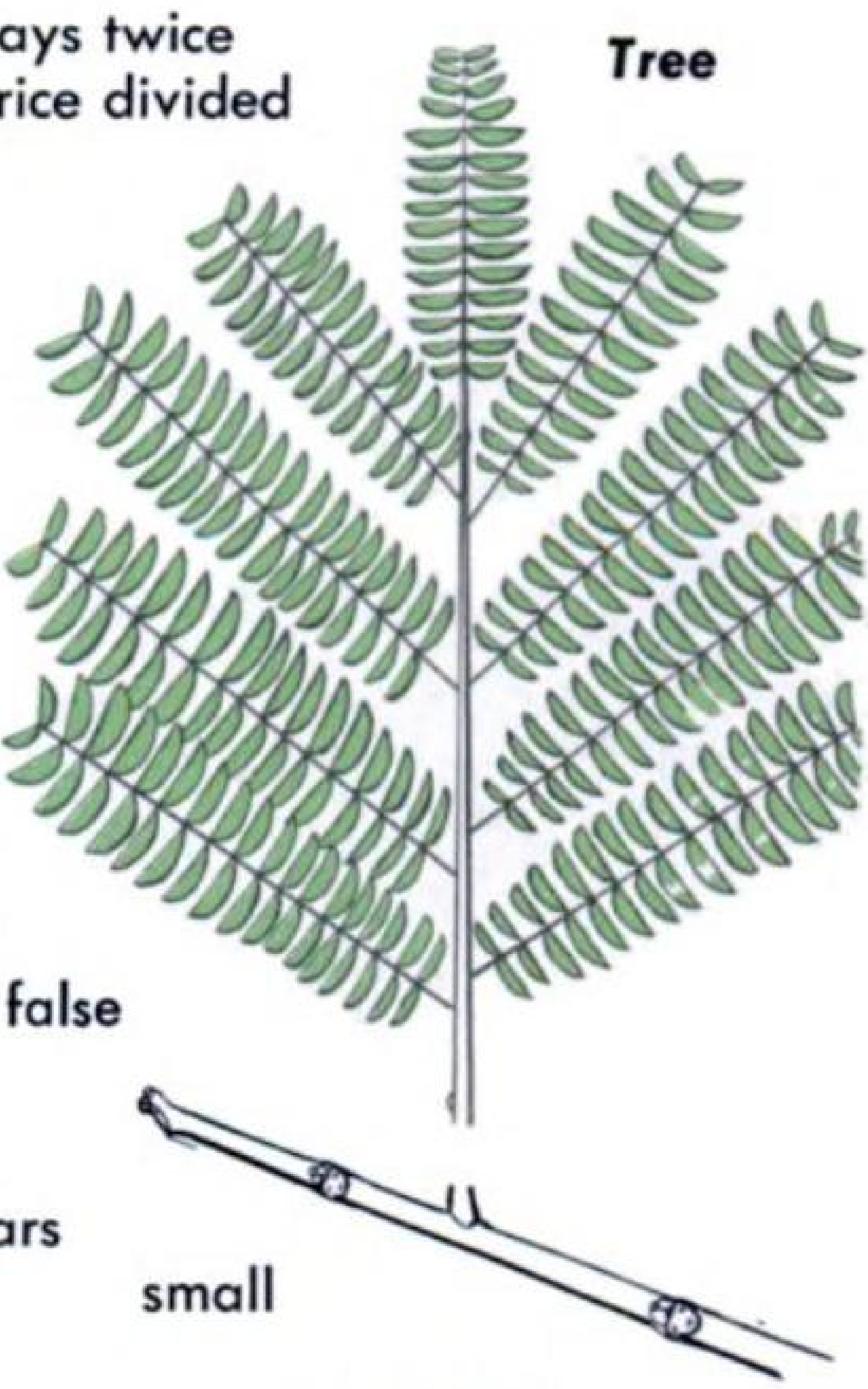
YELLOWROOT


usually
Vine
Tendrils opposite upper leaves
Pith contin-uous

PEPPER VINE


Tree
Leaves always twice and rarely thrice divided
Buds sunk in bark
End buds false
Leaf scars
large

COFFEE-TREE



ALBIZZIA

SECTION V

Broad-leaved Plants with Alternate Simple Leaves

OVER HALF of our woody plants fall in this category. Although a number of species therefore resemble one another in having alternate simple leaves, the separation of the group into subdivisions aids in their identification. The outline below indicates the major characteristics used in subdividing the group. It may be used as a general guide to identification. More detailed keys (A–F) follow it. (If in doubt about number of bundle scars, try both keys E and F.) A Winter Key to nonevergreen plants with alternate leaf scars is given in Appendix B, p. 378.

Major Subdivisions of Broad-leaved Plants with Alternate Simple Leaves

	Plate	*Key Subdivision*
1. Creeping, trailing or otherwise flattened shrubs	**32**	**A**
1. Climbing or sprawling vines	**33–37**	**B**
1. Erect trees and shrubs:		
2. Thorny plants	**37–40**	**C**
2. Thornless plants:		
3. Leaves lobed (see also Sweetfern, Plate 57; Groundsel-tree, Plate 58)	**41–46**	**D**
3. Leaves not lobed:		
4. Leaves fan-veined (with 3–5 main veins meeting near the leaf base) or leaf scars with 3 or more bundle scars	**43–59**	**E**
4. Leaves not fan-veined and leaf scars with 1 bundle scar	**60–68**	**F**

Subdivision A

Creeping, Trailing, or Otherwise Flattened Shrubs

These plants do not climb. They creep, trail, or become matted on the ground. All are grouped on Plate 32.

Subdivision B

Climbing or Sprawling Vines

	Name	*Plate*
5. Tendrils present:		
6. Prickly or green-stemmed	**GREENBRIERS**	33
6. Without prickles, brown-stemmed	**GRAPES (1), (2), etc.**	34, 35
5. Tendrils lacking:		
7. Leaves finely toothed and somewhat heart-shaped	**GRAPES (1), (2), AMPELOPSIS**	34, 35
7. Leaves not toothed or if so not heart-shaped:		
8. Leaf scars with more than 3 bundle scars; seeds crescent- or cup-shaped	**MOONSEEDS, etc.**	36
8. Leaf scars with 1 or 3 bundle scars; seeds neither crescent- nor cup-shaped	**MISCELLANEOUS**	37

Subdivision C

Erect Plants with Thorny or Prickly Twigs

	Name	*Plate*
9. Leaves not lobed:		
10. Thorns less than 1″ long or, if longer, then the buds not ball-shaped:		
11. Stems ridged; usually somewhat vinelike	**MATRIMONY-VINES**	37
11. Stems not ridged; never vinelike	**OSAGE-ORANGE**	38
10. Thorns mostly over 1″ long; buds ball-shaped	**HAWTHORNS**	39
9. Leaves lobed:		
12. Thorns equipped with buds or leaves	**CRABAPPLES**	38
12. Thorns without buds or leaves:		
13. Leaves mostly over 6″; leaf veins prickly	**DEVIL'S-CLUB**	38
13. Leaves mostly under 6″; leaf veins not prickly:		
14. Thorns mostly over 1″ long; buds ball-shaped	**HAWTHORNS**	39
14. Thorns under 1″ long; buds long	**GOOSEBERRIES**	40

Subdivision D

Erect Plants with Thornless Twigs and Deeply Lobed Leaves

	Name	*Plate*
15. Leaves fan-lobed, with 3–5 main veins meeting near the leaf base:		
16. Plants usually somewhat vinelike; pith with a solid partition near each leaf base	**SAND GRAPE**	34

Name *Plate*

- **16.** Plants upright, not vinelike; pith not as above or if so then the leaf surface very sandpaperlike:
  - **17.** Twigs with 2 long lines descending from each leaf scar; if 3 such lines are present then leaves and twigs are yellow-dotted (use lens); leaf scars narrow **CURRANTS** 41
  - **17.** Twigs without such lines, or if present they are quite short; yellow resin-dots are lacking (use lens); leaf scars variable:
    - **18.** Plants with all leaves lobed **MISCELLANEOUS** 42
    - **18.** Plants usually with some leaves not lobed **MULBERRIES, etc.** 43
- **15.** Leaves feather-lobed, with single midvein, other veins more or less at right angles to midvein:
  - **19.** Leaves wide, not at all fernlike **OAKS (1), (2)** 45, 46
  - **19.** Leaves long, narrow, quite fernlike **SWEETFERN** 57

Subdivision E

Erect Plants with Twigs Thornless and Leaves Not Lobed.
Either Leaves Fan-veined or Leaf Scars Contain
More Than 1 Bundle Scar

- **20.** Leaves mostly heart-shaped or triangular, with 3–5 stout veins meeting near the leaf base:
  - **21.** Bundle scars 3; leaves toothed; bark of upper branches and young trunks usually smooth whitish- or greenish-yellow; lowermost bud scale in the outside position squarely above the leaf scar; pith continuous **POPLARS** 44
  - **21.** Bundle scars 1 to many, or if 3 then leaflets not toothed or pith usually chambered; bud scales not as above **MISCELLANEOUS** 43
- **20.** Leaves neither heart-shaped nor triangular, or if so with only a single main midvein:
  - **22.** Twigs with clustered end buds:
    - **23.** Acorns or their cups present on the twigs or on the ground beneath the plant; bundle scars 4 or more **OAKS (3), (4)** 47, 48
    - **23.** Acorns absent; bundle scars 3:
      - **24.** Leafstalks with glands; broken twigs with a peculiar sour odor; trunk bark often with narrow cross stripes **FIRE CHERRY** 53
      - **24.** Without such characteristics; swamps from sw. Mo. south **CORKWOOD** 59
  - **22.** Twigs with single end buds:

Name — *Plate*

- **25.** Twigs with completely encircling lines or rings (stipule scars) beneath the leaf scars:
  - **26.** Leaves not toothed — **MAGNOLIAS** — **49**
  - **26.** Leaves toothed — **BEECH** — **57**
- **25.** Twigs without completely encircling lines (stipule scars):
  - **27.** Leaves not toothed and not definitely wavy-edged:
    - **28.** Buds with a single scale; leaves mostly narrow — **WILLOWS (1), (2)** — **55, 56**
    - **28.** Buds without scales or with more than 1 scale; leaves various:
      - **29.** Buds without scales:
        - **30.** Leaves usually under 6″ long, more or less elliptic or egg-shaped — **BUCKTHORNS** — **58**
        - **30.** Leaves usually over 6″ long, wedge-shaped — **PAWPAWS** — **59**
      - **29.** Buds with 2 or more scales:
        - **31.** Leaf bases uneven — **UPLAND HACKBERRY** — **43**
        - **31.** Leaf bases even — **MISCELLANEOUS** — **59**
  - **27.** Leaves with definite teeth or distinctly wavy-edged:
    - **32.** Leaves with distinct double teeth:
      - **33.** Leaf bases mostly uneven, one side being much lower than the other (see plates); buds many-scaled, the scales in 2 even rows:
        - **34.** Leaves quite long-pointed, usually triangular — **HACKBERRIES** — **43**
        - **34.** Leaves not long-pointed, mostly egg-shaped — **ELMS** — **50**
      - **33.** Leaf bases mostly even, both sides similar or only slightly uneven:
        - **35.** Buds with 2–3 scales, neither hairy nor narrowed at the base; if a tree, the older bark often conspicuously streaked horizontally — **BIRCHES** — **52**
        - **35.** Buds with 2 or more scales, hairy or narrowed at the base:
          - **36.** Leafstalks without glands near the leaf base; the older bark not streaked or slightly streaked — **IRONWOOD, etc.** — **51**

Name *Plate*

36. Leafstalks with small paired glands near the leaf base; if a tree, the older bark usually streaked horizontally **CHERRIES** **53**

32. Leaves with single teeth or definite wavy edges:

37. Bark of upper branches and young trunks often smooth and whitish- or greenish-yellow; lowermost bud scales located in the outside position squarely above the leaf scar; leafstalk often much flattened **POPLARS** **44**

37. Bark not of this type; bud scales, if present, not as above; leafstalks not much flattened:

38. Leafstalks mostly with a pair of small swollen glands near the leaf bases; broken twigs with a unique, strong, nonspicy odor; older bark often striped horizontally **CHERRIES** **53**

38. Leafstalks without glands; twigs without peculiar "cherry" odor; older bark striped or not:

39. Buds long, slender, reddish, the several scales with tiny dark tips and often twisted; trunk bark smooth and often twisted **JUNEBERRIES** **54**

39. Buds with a single scale; leaves usually long and slender **WILLOWS (1), (2)** **55, 56**

39. Buds otherwise:

40. Leaves spicy-scented when crushed and yellow resin-dotted (use lens) **BAYBERRIES** **57**

40. Leaves otherwise:

41. Pith chambered (see plate) **SWEET-SPIRES** **59**

41. Pith not chambered:

42. Leaves toothed, tips sharply pointed; leaf bases uneven; southern swamps **WATER-ELM** **50**

42. Leaves toothed, tips blunt; leaf bases even; northern bogs and barrens **BIRCHES** **52**

42. Leaves toothed or wavy-edged, tips pointed or not; leaf bases even or uneven **MISCELLANEOUS (1), (2)** **57, 58**

Subdivision F

Erect Plants with Thornless Twigs and Leaves Not Lobed. Leaves Not Fan-veined and Leaf Scars Containing only 1 Bundle Scar

Name *Plate*

- **43.** Shrubs with numerous tiny raised dots on the twigs (use lens):
  - **44.** Twig dots merely raised; twigs greenish or reddish; leaves and buds small; fruits many-seeded blue berries **BLUEBERRIES** 62
  - **44.** Twig dots brown or silver scales; twigs brownish; leaves and buds small to medium-sized; fruits brownish, 1-seeded, fleshy **SILVERBERRY, etc.** 68
- **43.** Trees and shrubs with twigs not dotted:
  - **45.** Leaf undersides with tiny bright yellow resin-dots (use lens) **HUCKLEBERRIES** 63
  - **45.** Resin-dots absent:
    - **46.** End buds clustered at twig tips, often large; leaves not toothed, edges with a hairy fringe (use lens):
      - **47.** Branchlets with tight bark **AZALEAS** 64
      - **47.** Branchlets with shreddy bark **MINNIEBUSH** 68
    - **46.** End buds not clustered at twig tips (though sometimes crowded toward the tip and sometimes large), or if so then leaves toothed; leaves toothed or not, edges not hairy-fringed:
      - **48.** Leaves evergreen, mostly leathery:
        - **49.** Spur branches usually present; tiny black thornlike stipules flanking each leaf scar (use lens); end buds true **HOLLIES** 61
        - **49.** Spur branches and stipules of the above type absent:
          - **50.** Fruits fleshy berries; end buds false **BILBERRIES, etc.** 63
          - **50.** Fruits dry capsules; end buds true or false **EVERGREEN HEATHS** 65
      - **48.** Leaves thin, not evergreen:
        - **51.** Leaf scars conspicuously raised, often with descending lines at the sides; twigs very long and slender; clustered small dry fruits commonly at twig tips; leaves toothed except occasionally in 1 species **SPIREAS** 60

	Name	*Plate*
51. Leaf scars not conspicuously raised; without lines at sides; twigs less wandlike; fruits, leaves various:		
52. Spur branches usually present; tiny black thornlike stipules flanking the leaf scars (use lens); end buds true; fruits fleshy; leaves toothed	**HOLLIES**	**61**
52. Spur branches and stipules of above type absent; end buds, fruits, and leaves variable:		
53. Pith chambered or buds without scales	**MISCELLANEOUS (1)**	**67**
53. Pith not chambered and buds scaly:		
54. Fruits small, fleshy, many-seeded and blue to black (red in 1 species)	**BILBERRIES, etc.**	**63**
54. Fruits dry, or if fleshy then not both dark-colored and many-seeded:		
55. Leaves toothed:		
56. End buds false:		
57. Fruits fleshy, red	**SOUTHERN MOUNTAIN-CRANBERRY**	**63**
57. Fruits small dry capsules	**NONEVERGREEN HEATHS**	**66**
56. End buds true:		
58. End buds much longer than side buds:		
59. Outer bud scales not as long as the buds	**TOOTHED AZALEA**	**64**
59. Outer bud scales as long as buds	**PEPPERBUSHES**	**66**
58. End buds about size of side buds	**SILKY-CAMELLIAS**	**67**
55. Leaves not toothed:		
60. Fruits small, fleshy, blue to black, many-seeded berries	**BILBERRIES, etc.**	**63**
60. Fruits dry capsules or pods, or if fleshy, then either not dark-colored or not many-seeded	**MISCELLANEOUS (2)**	**68**

Low Creeping or Trailing Shrubs

(*Plate 32, p. 298*)

Unlike the climbing or even sprawling vines of Plate 33 and elsewhere in the book, these plants largely creep, trail, or become matted on the ground. For the most part this group is of northern, often circumpolar, distribution. All on this plate except Alpine and Red Bearberries, Sand Cherry, and dwarf willows have leathery evergreen leaves. The flowers, except in Sand Cherry and dwarf willows, are vase-shaped.

In addition to the plants on this plate, there are a few others that occasionally are low-growing and thus subject to confusion. Among plants with small leathery leaves, Alpine-azalea and Pachistima (Plate 12) and Sandmyrtle (Plate 17) have mostly opposite leaves. Dwarf Bilberry (Plate 63) has flat elliptic leaves, shreddy older bark; Bog Rosemary (Plate 65) has curled leaves much whitened beneath. The matted evergreen plants of Plate 6 and other northern evergreens of Plates 3–5 have needlelike leaves.

Among nonevergreen plants with alternate simple leaves, Garden Red Currant, and especially Skunk Currant and Swamp Red Currant (Plate 41) may have reclining or sprawling branches. Northern Birch, Tundra Dwarf Birch, and Minor Birch (pp. 234–35) vary in growth from mats to erect shrubs; Newfoundland Dwarf Birch (p. 234) has creeping stems but erect branches. Beach Plum (Plate 53) and Graves Plum (p. 239) are often somewhat straggling. On sites exposed to severe weather, American Larch (Plate 2) and Mountain Alder (p. 230) form prostrate mats. Dewberries (Plate 23) and Shrubby Cinquefoil (Plate 30) may grow close to the ground but they have compound leaves. The nonevergreen simple-leaved plants that may grow in a creeping, trailing, or matted manner are all included in this key:

	Name	*Plate*
1. Twigs with warty spurs	**AMERICAN LARCH**	**2**
1. Twigs without warty growths:		
2. Buds covered by a single scale	**DWARF WILLOWS**	**32**
2. Buds covered by several scales:		
3. Leaves fan-lobed, maplelike	**CURRANTS**	**40, 41**
3. Leaves more or less egg-shaped:		
4. Leaf teeth rounded, wavy-toothed	**BEARBERRIES**	**32**
4. Leaf teeth sharp:		
5. End buds false	**PLUMS**	**53**
5. End buds true:		
6. Buds with 2–3 scales	**BIRCHES**	**52**
6. Buds with 4 or more scales:		
7. Twigs speckled; broken twigs with sour odor	**SAND CHERRY**	**32**
7. Twigs not speckled; broken twigs without sour odor	**MOUNTAIN ALDER**	**51**

CRANBERRIES and Close Relatives *Vaccinium* spp. **p. 298**

Recognition: Cranberries, mountain-cranberries, and Creeping

Blueberry are closely related members of same genus. Trailing plants with smooth, *hairless, odorless, evergreen* leaves. Stems neither hairy nor scaly. Flowers are small and bell-shaped and the fruits are many-seeded, globular, and edible either raw or cooked. The several species may be separated easily:

1. Leaves black-dotted beneath (use lens), with edges smooth **NORTHERN MOUNTAIN-CRANBERRY**
1. Leaves green beneath, wavy-edged **CREEPING BLUEBERRY**
1. Leaves whitened beneath, with edges smooth:
   2. Leaves very white beneath, tips pointed, edges rolled **SMALL CRANBERRY**
   2. Leaves pale beneath, tips blunt, edges not rolled **LARGE CRANBERRY**

Southern Mountain-cranberry (p. 282) is more erect and is discussed with the blueberries.

NORTHERN MOUNTAIN-CRANBERRY **p. 298**
Vaccinium vitis-idaea var. *minus* Lodd.

Recognition: A creeping mat-forming shrub with small egg-shaped, leathery, evergreen leaves *dotted beneath* with tiny black points (use lens). Stems slender. Leaves ¼″–¾″. Height to 7″. Flowers pink or red, June–July. Fruits red, Aug.–Oct. No other creeping shrub has black-dotted foliage. Southern Mountain-cranberry (p. 282) is an upright shrub. Rocky areas and bogs; subarctic south to Newfoundland, New England, sw. Ontario, n. Minnesota, Manitoba, and British Columbia.

CREEPING BLUEBERRY **p. 298**
Vaccinium crassifolium Andr.

Recognition: A scarce prostrate mat-forming shrub with small elliptic evergreen leaves. Leaves have *rolled wavy-toothed edges;* stems *slender,* rising from thickened base. Leaves 3⁄16″–⅝″. Flowers white or pink, June–Aug. Fruits black, shiny, sweet, Aug.–Oct. Other blueberries often are not tall but, though low, generally on upright stems. Sandy or acid soils; se. Virginia and e. S. Carolina.

SMALL CRANBERRY *Vaccinium oxycoccus* L. **p. 298**

Recognition: A creeping shrub. Leaves small, egg-shaped or triangular, *pointed,* evergreen. They have *rolled edges* and are *white beneath.* Stems *very slender.* Typically, leaves are less than ⅜″ long and fruits less than ⅜″, but var. *ovalifolium* Michx. has leaves as large as those of Large Cranberry and fruits may be as big, up to 7⁄16″. Leaves 3⁄16″–⅝″. Flowers pink, May–July. Fruits red or dark red, rarely white, Aug.–Oct. Leaves of Large Cranberry blunt, larger, and pale white beneath. Those of Bog Rosemary (Plate 65) white beneath, pointed, and with rolled edges, but much larger and the

fruits are dry capsules. Bogs; Greenland, Labrador, and Alaska to Newfoundland, New Jersey, Pennsylvania, mountains of Virginia, W. Virginia, and N. Carolina, n. Ohio, Michigan, Minnesota, Manitoba, Saskatchewan, and Oregon.
Remarks: Chipmunks, sharptail grouse, pheasant eat fruits.

LARGE CRANBERRY *Vaccinium macrocarpon* Ait. **p. 298**
Recognition: A creeping shrub. Leaves small, wedge-shaped to round, *blunt-tipped*, evergreen, flat or with slightly rolled edges, *slightly whitened or pale beneath.* Stems slender. Leaves ¼″–⅝″. Flowers pinkish, June–Aug. Fruits red or dark red, 7/16″–13/16″ across, Sept.–Nov. See Small Cranberry. Boggy places; Newfoundland and Minnesota to Long Island; mountains to N. Carolina, W. Virginia, Ohio, Illinois, and Arkansas.
Remarks: Many varieties grown commercially. Ruffed and sharptail grouse, bobwhite, mourning dove, and several songbirds may include Large Cranberry in their diets.

SNOWBERRY WINTERGREEN (CREEPING SNOWBERRY)
Gaultheria hispidula (L.) Bigel. **p. 298**
Recognition: A mat-forming evergreen. Leaves small, pointed, *brown-hairy* beneath; have rolled edges and *spicy odor* when crushed. Slender stems, too, are *brown-hairy.* Leaves ¼″–½″. Flowers small, white, May–June. Fruits small white berries, Aug.–Sept.
Remarks: Fruits eaten by ruffed and spruce grouse, thrushes.

SMOOTHLEAF DRYAS *Dryas integrifolia* Vahl **Not illus.**
Recognition: An arctic trailing or matted shrub with leathery foliage. Leaves narrowly heart-shaped or triangular to elliptic, *whitened beneath,* short-stalked, with prominent sunken veins, *toothless* or with a few teeth near base; edges rolled. One form has foliage hairy or whitened above. Stems have *shreddy bark* and buds have several scales. Leaves ¼″–⅞″. Flowers white, June–July. Fruits small, with a feathery plume. Cranberries also have leaf undersides whitened but stems are not shreddy. Toothleaf Dryas has toothed leaves. Tundras and stony barrens; n. Canada and Alaska to w. Newfoundland, e. Quebec, Hudson Bay, and Alberta.

TOOTHLEAF DRYAS **Not illus.**
Dryas drummondii Richards.
Recognition: Generally like Smoothleaf Dryas but more southern. Leaves elliptic to egg-shaped, *toothed.* Twigs and stems *white-hairy.* Foliage may be sparsely hairy. Stony ground; w. Newfoundland and Alaska to e. Quebec, s. and centr. Ontario, Montana, and Oregon.

RHODODENDRON ROSEBAY **p. 298**
Rhododendron lapponicum (L.) Wahlenb.
Recognition: A gnarled mat-forming evergreen. Leaves narrow

to wide-elliptic, somewhat *wrinked above, yellow-brown scaly beneath.* Twigs similarly scaly. Leaves ¼″–¾″. Flowers *attractive, purple,* ⅜″–⅞″ across, June–July. Fruits small dry capsules on upright stalks, usually present.

Similar species: The taller azaleas and rhododendrons are on Plates 64 and 65. Leatherleaf, with yellow-brown scaly evergreen leaves, also is taller (see Plate 65).

EVERGREEN BEARBERRY **p. 298**

Arctostaphylos uva-ursi (L.) Spreng.

Recognition: A trailing shrub. Leaves wedge-based to elliptic, *evergreen,* hairless, smooth-edged, and *green on both sides.* Twigs variously sticky fine-hairy, finely white-woolly, black-dotted, sticky-hairy, or (after late summer) hairless. Leaves ¾″–1¼″. Flowers small, pink or white, May–July (and Oct.–Nov. in a form found in extreme e. Massachusetts). Fruits red, fleshy but dry, ball-shaped, often present through winter.

Similar species: (1) Alpine and (2) Red Bearberries, northeastern forms, have wavy-edged leaves that either drop off or become withered in winter.

Remarks: Related manzanitas, common in western N. America, represented in East only by this and next 2 inconspicuous species. Evergreen Bearberry fruits important food for grouse and bears. Deer occasionally browse foliage.

ALPINE BEARBERRY **Not illus.**

Arctostaphylos alpina (L.) Spreng.

Recognition: Similar to the Evergreen Bearberry but with leaves only thin-leathery, *withering* but usually remaining attached in winter, more egg-shaped, wrinkled, net-veined, and *wavy-toothed.* Lower portions of leaves and leafstalks have bristly hairs along margins. Inner bud scales have rounded tips. Twigs hairless; branches have papery bark; bundle scars single. Leaves to 1½″. Fruits dark, juicy, somewhat edible. Poor soils; Arctic to Newfoundland and mountains of Quebec, Maine, and New Hampshire.

RED BEARBERRY **Not illus.**

Arctostaphylos rubra (Rehd. & Wils.) Fern.

Recognition: Like Alpine Bearberry but leaves not leathery, and much wrinkled; do not usually drop in winter. Leaves lack bristly hairs. Inner bud scales pointed at tips. Stems mostly underground. Leaves to 3″. Fruits scarlet and juicy. See under Evergreen Bearberry. Rocky areas; nw. Newfoundland and Alaska to e. Quebec and Alberta.

REDBERRY WINTERGREEN **p. 298**

Gaultheria procumbens L.

Recognition: A creeping shrub with elliptic to nearly circular *evergreen* leaves. Foliage hairless and *spicy-scented* when crushed. Stems and twigs hairless. Leaves 1″–2″. Flowers small, white, July–Aug. Fruits red, pea-shaped, edible, Aug.–June. **Remarks:** Leaves sometimes used as tea (also called Teaberry). Foliage yields oil of wintergreen. Fruits eaten by many wild animals, including bobwhite, ruffed and sharptail grouse, and pheasant. Deer take both fruits and leaves.

COMMON PIPSISSEWA **Not illus.**
Chimaphila umbellata (L.) Bart.
Recognition: Creeping evergreen, hardly woody, with short *upright* stems. Leaves alternate or whorled, leathery, shiny, green, *wedge-shaped*, coarse-toothed, not aromatic. Leaves 1″–3″. Height to 10″. Flowers white to pink, clustered, July–Aug. Fruits dry capsules. Forests, Nova Scotia and Alaska to Georgia, ne. Illinois, Minnesota, and California.

MOTTLED PIPSISSEWA (SPOTTED WINTERGREEN)
Chimaphila maculata (L.) Pursh. **Not illus.**
Recognition: Similar to Common Pipsissewa but leaves broader, widest below the middle, *variegated* whitish. Flowers white, June–Aug. Forests, s. New Hampshire and Michigan to Georgia, Alabama, Tennessee.

TRAILING ARBUTUS *Epigaea repens* L. **p. 298**
Recognition: A trailing shrub with wide, *heart-shaped*, usually hairy-edged leaves. Leaves vary from rough and hairy on both surfaces to hairless. Twigs normally *brown-hairy*. Leaves 1″–5″. Flowers white or pink, delicately fragrant, March–July. Fruits dry capsules, May–Aug., or longer.

SAND CHERRY *Prunus depressa* Pursh **p. 298**
Recognition: A prostrate shrub. Leaves narrow, wedge-based, green above, pale or whitish beneath, shallowly toothed and thin, not evergreen. The pair of tiny glands present on leafstalks of most cherries occurs on some leaves here. Twigs *reddish, speckled, with lines* leading from leaf scars; sour odor when broken. Older bark somewhat speckled. Buds many-scaled; bundle scars 3. Leaves 1″–3″. Flowers white, ½″ across, April–May. Fruits purplish, pea-sized, bitter, June–Aug.
Similar species: Other cherries are on Plate 53.

DWARF WILLOWS *Salix* spp. **p. 298**
Recognition: At high altitudes and at northern latitudes, several willows occur as creeping shrubs. All have characteristic *single bud scale* of willows. None are evergreen. Bundle scars 3; bark not speckled. Catkins of inconspicuous flowers may be present; small dry fruits fall quickly. Other willows on Plates 55, 56; more truly dwarf willows listed below.

WIDELEAF DWARF WILLOW **Leaf illus., p. 298**
Salix herbacea L.

Recognition: A tiny shrub with main branches underground and, like next 3 species, aboveground branches *rooting.* Leaves broad, usually heart-shaped, hairless, shiny, *green on both sides,* wavy-toothed, and with *netted veins* obvious beneath. Leaves ½″–1¼″. Flowers June–July. Arctic tundras south to mountains of Newfoundland, e. Quebec, Maine, New Hampshire, and New York.

NETVEIN DWARF WILLOW *Salix reticulata* L. **Not illus.**

Recognition: Similar to Wideleaf Dwarf Willow. Leaves oval to nearly circular, pale, and *much net-veined beneath,* edges rolled, teeth small or lacking. Leafstalks reddish, over ¼″. Buds hairless, somewhat sticky. See Wideleaf Dwarf Willow. Leaves ½″–2″. Flowers June–July. Barren areas; Labrador to n. and nw. Newfoundland.

BELLE ISLE DWARF WILLOW **Not illus.**
Salix jejuna Fern.

Recognition: Like preceding but leafstalks *only* ¼″ or shorter. Leaves smaller (¼″–1″), *somewhat pointed, not toothed.* See Wideleaf Dwarf Willow. Rocky places; se. Labrador and n. Newfoundland.

SMOOTH DWARF WILLOW **Not illus.**
Salix leiolepis Fern.

Recognition: Similar to Belle Isle Dwarf Willow but leaves *round-tipped and wavy-toothed.* See Wideleaf Dwarf Willow. Mossy limestone soils; local, se. Newfoundland.

BEARBERRY DWARF WILLOW **Leaf illus. p. 298**
Salix uva-ursi Pursh

Recognition: This and the following 3 species have branches aboveground which *do not take root.* Leaves of this species narrow, *wedge-based* with *sharply fine-toothed* margins, usually shiny and hairless but woolly above in 1 uncommon form. Foliage not obviously net-veined beneath. Twigs hairless. A hybrid with Wideleaf Dwarf Willow occurs on Mount Adams, New Hampshire, and near Hudson Bay. See also Taller Willows (opposite). Leaves ¼″–1″. Flowers June–July. Tundras; Greenland and eastern arctic archipelago to Newfoundland, Nova Scotia, and mountains of Quebec, n. New England, and n. New York.

TUNDRA DWARF WILLOW **Not illus.**
Salix arctophila Cockerell

Recognition: Similar to Bearberry Dwarf Willow but leaves *not toothed.* Foliage *dark green, shiny* above and wider than in

Bearberry Dwarf Willow. Twigs brittle when dry. Leaves ½″–2″. Tundras of Greenland, eastern Arctic, and n. Quebec to Newfoundland; mountains of e. Quebec and Maine.

ARCTIC DWARF WILLOW *Salix arctica* Pallas **Not illus.**
Recognition: Like Tundra Dwarf Willow but leaves *pale green*, barely shiny. Foliage quite variable, with leaves narrow to nearly heart-shaped or circular, hairless to hairy, thick or thin. Twigs *flexible*. Leaves 1″–3″. See also Taller Willows (below). Tundras of arctic coastal areas south to mountains of Newfoundland, and e. Quebec; also mountains of Alberta and British Columbia.

WIEGAND DWARF WILLOW **Not illus.**
Salix wiegandii Fern.
Recognition: A mat-forming shrub with *white-woolly* twigs and buds. Leaves elliptic, *leathery, somewhat white-woolly* on both surfaces; edges slightly rolled. Branches do not root. Unlike other dwarf willows with such branches, *large leafy* stipules occur where leaves are attached to twigs. See also Taller Willows, next. Leaves ½″–2″. Limestone soils; nw. Newfoundland.

TALLER WILLOWS sometimes flattened or mat-forming
Recognition: Several willows sometimes grow flat on ground, yet at other times are somewhat more erect. They include: Bluntleaf Willow (p. 257), which resembles Bearberry Dwarf Willow but has larger coarse-toothed leaves; Ungava Willow (p. 252), which is like Arctic Dwarf Willow and similarly variable but leaves often heart-shaped at base and both leaves and twigs usually gray-hairy; Roundleaf Willow (p. 259), which also is similar to Arctic Dwarf Willow but has egg-shaped to circular leaves dark green above, twigs and leaf undersides shiny white-hairy, and branches sharply angled; Limestone Willow (p. 253), which resembles Wiegand Dwarf Willow in possessing stipules but differs in having hairless, more circular leaves. See also the quite local Newfoundland, Mount Albert, and Spreading Willows (pp. 253–54) and nonwidespread Myrtleleaf Willow (p. 257).

Greenbriers

(*Plate 33, p. 300*)

These are some of the few woody members of the lily family. Greenbriers are green-stemmed vines climbing by tendrils attached to bases of leafstalks, which remain after leaves drop. Stems have no central pith and leaves are parallel-veined. Most are prickly and some retain foliage in winter, particularly in the South.

Flowers are small and greenish. In our area, no other tendril-equipped vines are green-stemmed and, except for a few roses (Plate 23), no other climbing vines are prickly. Boston Ivy (p. 188) has shiny evergreen leaves but these are 3-lobed or 3-parted. All of our vines except greenbriers have central piths and nonparallel leaf veins. Some greenbriers are herbaceous; only those with woody stems are considered here.

Greenbrier fruits are small berries with 1 to several large seeds. They are eaten by songbirds, bobwhite, ruffed grouse, and wild turkey. Stems browsed by cottontail and marsh rabbits.

Hellfetter, Blasphemy-vine, and Tramps' Troubles are realistic colloquial names.

LAUREL GREENBRIER *Smilax laurifolia* L. **p. 300**

Recognition: A high-climbing vine with *leathery evergreen* leaves. Leaves elliptic, green on both sides; many lack tendrils. Stems round with prickles *absent or present on vigorous shoots* and near stem bases. Leaves 2″–5″. Flowers July–Aug. Fruits black, Aug.–Sept.

Similar species: Only truly evergreen greenbrier. (1) Redberry Greenbrier mostly without prickles but has thinner, wider leaves, and red fruits. (2) Hellfetter Greenbrier has some fiddle-shaped leaves present. (3) Bullbrier Greenbrier has 4-angled stems.

REDBERRY GREENBRIER *Smilax walteri* Pursh **p. 300**

Recognition: A low vine, sprawling over bushes. Leaves neither leathery nor evergreen, broadly *heart-shaped*, and green beneath. Tendrils plentiful. Stems round, lower half with scattered slender prickles. Branches and twigs *without prickles*. Leaves 2″–5″. Flowers April–June. Fruits *red*, Sept.–Oct., or longer.

Similar species: Our only red-berried greenbrier. (1) Laurel and (2) Hellfetter Greenbriers also may be separated from this species by leaf shape.

BRISTLY GREENBRIER **p. 300**

Smilax tamnoides var. *hispida* (Muhl.) Fern.

Recognition: A high-climbing vine. Leaves nonleathery, green beneath, egg- to heart-shaped. Stems round, *weak bristles*. Leaves 2″–5″. Flowers May–July. Fruits Sept.–Nov., or longer.

Similar species: Among greenbriers with weak prickles, (1) Hellfetter Greenbrier differs in being only sparsely prickly on upper parts; (2) Glaucous Greenbrier has whitened leaf undersides.

HELLFETTER GREENBRIER **Not illus.**

Smilax tamnoides L.

Recognition: The typical form of species (Bristly Greenbrier a variety). Similar to its variety except that upper twigs, branches, and stem mostly without prickles and some leaves fiddle-shaped (see Bullbrier Greenbrier). Mostly Coastal Plain; e. Virginia to Florida, west to e. Texas, and north in Mississippi Valley to Kansas.

GLAUCOUS GREENBRIER *Smilax glauca* Walt. **p. 300**
Recognition: A high-climbing vine. Leaves nonleathery, *whitened,* hairy or hairless beneath, narrowly to broadly heart-shaped. Stems round, often whitened, with many or scattered *weak prickles.* Leaves 2″–5″. Flowers May–June. Fruits blue or black, with white powdery surface, Sept.–Oct., or longer.
Similar species: Only greenbrier with whitened leaf undersides.

BULLBRIER GREENBRIER *Smilax bona-nox* L. **p. 300**
Recognition: A highly variable species; has been separated into 3 varieties in addition to typical form. Typical form a widespread shrub that rarely climbs high. Leaves *leathery, triangular* (see dotted lines in drawing) to *fiddle-shaped,* with bases heart-shaped, green beneath but often mottled with white. Leaves have *bristly edges* and quite prominent veins. Two southern varieties have similar habits but foliage differs: var. *exauriculata* Fern. has narrow leaves with heart-shaped bases; var. *hastata* (Willd.) A. DC. has leaves with narrow tips and enlarged heart-shaped bases. These varieties are confined to se. Virginia and southward. Only other widespread form is var. *hederaefolia* (Beyrich) Fern., a high-climbing vine with leaves variable in shape, seldom mottled, and sometimes lacking hairy fringe. Stems of all are *4-angled* with *many stout prickles;* bases somewhat scaly. Some twigs may be without prickles. Rootstocks (underground) are thick and knobby. Leaves 2″–5″. Flowers May–June. Fruits black, 1-seeded, Oct.–spring.
Similar species: This and Common Greenbrier are only greenbriers with angled stems. Leaves in Common Greenbrier lack fringed edges.

COMMON GREENBRIER *Smilax rotundifolia* L. **p. 300**
Recognition: Similar to Bullbrier Greenbrier but leaves *broadly rounded* or heart-shaped, less thick, with less prominent veins and *no fringe* on edges; green on both sides. Stems either angled or rounded, with many strong prickles; bases smooth, not scaly. Rootstocks long and slender. Leaves 2″–5″. Flowers April–Aug. Fruits blue-black, with powdery bloom, mostly 2-seeded, Sept.–spring.

Grapes
(and Ampelopsis and Boston Ivy)

(*Plates 34 and 35, pp. 302, 304*)

The grapes are thornless, dark-stemmed, green-flowered, mostly shreddy-barked, and high-climbing vines that climb by means of tendrils. Leaves are toothed, heart-shaped, especially at base, and often lobed (see Cat Grape, Plate 35). In most species the pith is brown and not continuous (see Winter Grape, Plate 35), interrupted by partitions across twig centers near each leaf scar. Only other native vines climbing by tendrils are Cross Vine (Plate 7), which has opposite compound leaves, Virginia creepers (Plate 30), which have compound leaves and continuous pith, and greenbriers (Plate 33), which have persistent leaf bases, green stems, and usually thorns. Boston Ivy (p. 188) occasionally escapes from cultivation. Its leaves, however, are shiny and sometimes evergreen and tendrils are disk-tipped. Cissus (p. 132) also has 3-parted leaves and white pith. Winter specimens of Muscadine Grape and Ampelopsis can be distinguished from Virginia creepers by unbranched tendrils. Not all grape species can be readily identified in winter condition. The woody pith diaphragms are evident in the drawings of Winter and Cat Grape. Buds short, with 2 scales.

A number of cultivated varieties have been developed from wild grapes. During warm months, sap from grape stems can provide a cool drink, but the plant is destroyed in the process. A 6-foot section from a vine 2 inches in diameter will yield a pint of pure fluid. Upper cut must be made first.

Almost 100 species of songbirds have been recorded eating grapes. Animals utilizing these fruits include ruffed and sharptail grouse, prairie chicken, bobwhite, "Hungarian" partridge, pheasant, wild turkey, mourning dove, striped skunk, gray fox, red fox, coyote, raccoon, cottontail rabbit, red squirrel, and opossum.

Ampelopsis is a related vine with bluish inedible berries.

FOX GRAPE *Vitis labrusca* L. **p. 302**

Recognition: Leaf undersides and twigs densely covered with *red-woolly felt.* Leaf uppersides dark green, somewhat leathery. Tendrils or fruit clusters *opposite nearly every leaf.* Though typically with large leaf teeth, 1 variety (*subedentata* Fern., New York to S. Carolina) has few, poorly developed teeth. Leaves 3″–9″. Flowers May–July. Fruits black, purple, or amber, sweet, ½″–1″, Aug.–Oct.

Similar species: Most grapes regularly have tendrils absent from opposite every 3rd leaf. This and (1) New England Grape are only ones consistently to have more tendrils present. (2) Exceptional specimens of Dune Grape have more tendrils but leaf hairiness is not red. (3) New England Grape has leaves that soon lose hairiness; older leaves and twigs nearly hairless. (4) Summer Grape and (5) Winter Grape (Plate 35) are woolly but tendrils are absent opposite every 3rd leaf.

Remarks: Concord and other cultivated grapes have been derived from Fox Grape.

NEW ENGLAND GRAPE **Not illus.**
Vitis novae-angliae Fern.

Recognition: Resembles Fox Grape in having tendrils opposite most leaves and red-hairy leaves and twigs, but leaves soon lose hairiness. Older leaves and twigs hairless or with sparse loose patches of cottony hair. Winter Grape (Plate 35) has angled twigs and fewer tendrils. Flowers June–July. Fruits purple-black and shining, bitter, ½″–¾″, Sept. Fertile soils; New England, e. New York, New Jersey, and Pennsylvania.

SUMMER GRAPE *Vitis aestivalis* Michx. **p. 302**

Recognition: Leaf undersides and twigs *loosely red-woolly*, at least on new growth and on leafstalks and veins. Tendrils lacking opposite every 3rd leaf. Woody partitions across pith ⅛″–3/16″ thick. Leaves 2″–9″. Flowers May–July. Fruits black, 3/16″–½″, seeds less than 3/16″, Sept.–Oct., or longer.

Similar species: (1) Silverleaf Grape is only a variety of this species; intermediate specimens are found. (2) Fox Grape differs in tendril arrangement. (3) Postoak Grape has thinner pith partitions; (4) Winter Grape (Plate 35) has angled twigs.

SILVERLEAF GRAPE **p. 302**
Vitis aestivalis var. *argentifolia* (Munson) Fern.

Recognition: Classified as a variety of Summer Grape, this form may be quite distinctive. Hairless leaf undersides and often twigs *white with powdery bloom.*

Similar species: A variety of Postoak Grape is similar but has thinner pith diaphragms and larger fruits and seeds.

POSTOAK GRAPE *Vitis lincecumii* Buckl. **Not illus.**

Recognition: This south-central species resembles Summer Grape, even to extent of having a hairless, pale-leaved variety (*glauca* Munson) similar to Silverleaf Grape. Red-hairiness on lower surfaces of leaves of typical form is less dense than in Summer Grape. Diaphragms dividing pith are only 1/16″–⅛″ thick. Flowers May–June. Fruits purple-black, ⅜″–1″, seeds more than 3/16″, July–Sept. Woods and thickets; s. Indiana, Missouri, and se. Kansas to Mississippi and Texas.

FROST GRAPE *Vitis vulpina* L. **p. 302**

Recognition: Leaves shiny above, *hairless*, green beneath, and seldom deeply lobed, longer than broad; teeth broad. Twigs *hairless* or nearly so. Tendrils lacking opposite every 3rd leaf. Diaphragms across pith ⅛″–¼″ thick. Leaves 2″–9″. Flowers May–June. Fruits black, shining, sweet, ⅛″–⅜″, Sept.–Oct. **Similar species:** Three grapes are high-climbing with hairless twigs and hairless leaves green beneath. This species differs from (1) Riverbank Grape in leaf tooth shape and thicker pith diaphragms; from (2) Cat Grape (Plate 35) in having brown twigs and usually unlobed leaves.

RIVERBANK GRAPE *Vitis riparia* Michx. **p. 302**

Recognition: Leaves shiny, green beneath, hairless except for occasional indistinct fringe of fine hairs; often deeply lobed (as in Cat Grape). Leaf tips and teeth somewhat *long-pointed.* Twigs brownish, green, or red, hairless or nearly so. Pith diaphragms woody, only 1⁄32″–3⁄32″ thick. Tendrils normally absent opposite every 3rd leaf (but see Dune Grape, next). Leaves 2″–9″. Flowers May–July. Fruits blue-black, with whitish powder, bitter (may be without powder and sweet in sw. Illinois and ne. Missouri), 5⁄16″–½″, Aug.–Sept.

Similar species: Both (1) Frost Grape and (2) Cat Grape (Plate 35) have thicker pith diaphragms. (3) Dune Grape has hairy leaf undersides.

DUNE GRAPE **Not illus.**

Vitis riparia var. *syrticola* (Fern. & Wieg.) Fern.

Recognition: Like typical Riverbank Grape but with leaf undersides very soft-hairy and tendrils sometimes more numerous. Differs from Fox Grape in that the hairiness is not reddish; from Winter Grape (Plate 35) in lacking ridged twigs. Great Lakes sand dunes; New York to Michigan and Indiana.

SAND GRAPE *Vitis rupestris* Scheele **p. 302**

Recognition: A low bushy grape with tendrils *absent*, or present only near the tips of twigs. Leaves shiny, broader than long even though leaf tips may be somewhat long-pointed. One form has much-lobed leaves. Leaves and brown twigs hairless. Pith diaphragms 1⁄16″–⅛″ thick. Leaves 2″–9″. Flowers May. Fruits black, with or without powdery surface, sweet, about ⅜″, July–Aug.

Similar species: Bush Grape is of similar growth habits but is hairy and more western.

BUSH GRAPE *Vitis acerifolia* Raf. **Not illus.**

Recognition: Similar to Sand Grape, but twigs and leaves densely hairy. Flowers May. Fruits July–Aug. Dry places; sw. Missouri and se. Colorado to Texas.

Plate 35

(p. 304)

MUSCADINE GRAPE *Vitis rotundifolia* Michx. **p. 304**

Recognition: Unique among grapes in usually having smooth dark bark marked with small dots, *no woody pith partitions,* and tendrils *not forked.* Twigs crowded with tiny white, often raised dots. Pith *brown;* leaves thick, shiny. Leaves 2″–9″. Flowers June. Fruits purple-black, thick-skinned, sweet, ½″–1″, Sept.–Oct.

Similar species: See American Ampelopsis.

AMERICAN AMPELOPSIS *Ampelopsis cordata* Michx. **p. 304**

Recognition: Similar to Muscadine Grape but with pith *white* and leaves regularly heart-shaped. Leaves more finely toothed and bases not so deeply cut. Plant often bushy, not high-climbing. Tendrils may be scarce or lacking. Leaves 3″–6″. Flowers May–June. Fruits bluish, pea-sized, dry, inedible, Aug.–Nov.

Similar species: This and the next are the only white-pithed vines with nonforked tendrils.

Remarks: Sometimes cultivated for colorful fruits, which are eaten by several songbirds and bobwhite.

ASIATIC AMPELOPSIS **Not illus.**

Ampelopsis brevipedunculata (Maxim.) Trautv.

Recognition: Similar to American Ampelopsis but with hairy, longer-pointed, 3-lobed leaves. Fruits blue to purple. Escaped from cultivation; New England and Ohio southward.

CAT GRAPE *Vitis palmata* Vahl **p. 304**

Recognition: Leaves hairless, green beneath, somewhat long-pointed, *usually deeply lobed.* Twigs *hairless, generally red.* Woody pith partitions about 3⁄16″ thick. Tendrils absent opposite every 3rd leaf. Leaves 2″–9″. Flowers June–July. Fruits black, without powdery bloom, sweet, 3⁄16″–5⁄16″, Oct.

Similar species: (1) Frost Grape has brown twigs and mostly unlobed leaves; (2) Riverbank Grape has thinner pith partitions (both on Plate 34).

WINTER GRAPE *Vitis cinerea* Engelm. **p. 304**

Recognition: Leaves *gray-hairy* or (less commonly) white-hairy on both surfaces, but upper surface becomes hairless. Foliage rarely deeply lobed. Twigs are *ridged and gray-hairy.* Var. *floridana* Munson is red-hairy but occurs north only to e. Virginia and Arkansas. Tendrils absent opposite every 3rd leaf.

Leaves 2″–9″. Flowers June–July. Fruits black, sweet when ripe, 3/16″–½″, Sept.–Oct.
Similar species: Typical form is only grape with gray-hairy twigs and leaves. Red-hairy form is distinct from (1) Summer and (2) Postoak Grapes in having angled twigs; from (3) Fox and (4) New England Grapes in twig shape and tendril arrangement (see Plate 34). (5) See also Possum Grape.

POSSUM GRAPE *Vitis baileyana* Munson **Not illus.**
Recognition: Resembles Winter Grape except that hairiness, especially on leaves, is loose, not close-matted. Fruits ripen earlier. Flowers May–June. Fruits black, sweet, ⅛″–⅜″, Aug.–Oct. Bottomlands; e. Virginia, Kentucky, and Missouri to Alabama and Arkansas.

BOSTON IVY **Not illus.**
Parthenocissus tricuspidata (Sieb. & Zucc.) Planch.
Recognition: A high-climbing vine often occurring on buildings and trees; occasionally escapes from cultivation. Leaves *shiny,* toothed, *3-lobed,* with heart-shaped bases. Some lower leaves may be divided into 3 leaflets. Distances between leaves very short. Climbs by means of *short disk-tipped* tendrils. Only Virginia Creeper (Plate 30) also has disk-tipped tendrils, but its leaves are 5-parted. See English Ivy (opposite) and Cissus (p. 132). Asiatic origin; local, Massachusetts to Ohio.

Moonseeds

(*Plate 36, p. 306*)

These represent a family mostly tropical in distribution. They are thornless, nonevergreen vines that climb by green twining stems. Leaves are fan-veined, usually lobed. Buds small, hairy. The soft fruits contain single crescent- or cup-shaped seeds.

Moonseeds differ from other twining vines in having *more than 3 bundle scars* per leaf scar. Leaf shapes and unusual seeds are diagnostic.

REDBERRY MOONSEED *Cocculus carolinus* (L.) DC. **p. 306**
Recognition: A scrambling vine, partly evergreen in southern parts of range. Leaves variable; egg-, triangular-, or heart-shaped and may be lobed. Leafstalks under 2″. Leaves and twigs fine-hairy. Leaves 2″–8″. Flowers green, July–Aug. Fruits *red,* pea-sized, with crescent-shaped ridged seeds, Sept.–Oct., or longer.

CUPSEED *Calycocarpum lyoni* (Pursh) Gray **p. 306**
Recognition: A nearly hairless, high-climbing southern vine.

Leaves large, deeply 3- *to 5-lobed,* bases of leaf blades joined to 2″–6″ leafstalks. Stems stout. Leaves 5″–11″. Flowers greenish, May–June. Fruits black, to 1″, with cuplike seeds, Aug.–Oct.

CANADA MOONSEED *Menispermum canadense* L. **p. 306**
Recognition: A nearly hairless scrambling vine with *large shallowly lobed* leaves. Leaf bases *not attached* to 2″–6″ stalks. Stems slender. Leaves 5″–11″. Flowers white, May–July. Fruits black, with whitish powder, size of small grapes, Sept.–Oct.
Remarks: Fruits probably among those responsible for reports of poisoning by "wild grapes." They should not be eaten.

Miscellaneous Vines Climbing without Tendrils

(*Plate 37, p. 308*)

False Jessamine, and Silkvine (p. 70), honeysuckles (Plate 13), a few roses (Plate 23), wisterias (Plate 30), moonseeds (Plate 36), and most plants of this plate climb or scramble over other vegetation or objects by twining stems. No tendrils, aerial roots, twining leafstalks, or other climbing accessories occur except in English Ivy.

False Jessamine, Silkvine, honeysuckles have opposite leaves; roses are throny; moonseeds have more than 3 bundle scars. Wisterias have compound leaves and long, silky buds.

ENGLISH IVY *Hedera helix* L. **Not illus.**
Recognition: The only alternate-leaved vine climbing with *aerial rootlets.* Evergreen with dark green *leathery* leaves, mostly fan-lobed. Common on buildings; escaped to woods, Virginia southward. See Boston Ivy (opposite).

AMERICAN BITTERSWEET *Celastrus scandens* L. **p. 308**
Recognition: A tangled or high-climbing vine with egg- to wedge-shaped, somewhat long-pointed, finely wavy-toothed leaves. Buds small, pointed, sharply set *nearly at right angles* to stems. Stems round, hairless, thornless, brown. Leaf scars not raised; bundle scar single. Leaves 2″–5″. Climbs to 60′. Flowers small, green, clustered, May–June. Fruits ornamental clustered orange-colored pods that open to reveal scarlet seed-coverings, Sept.–Dec., or longer.
Similar species: Fruits distinctive, if present. Strawberry-bushes (Plate 12) have similar fruits; may trail, resembling vines, but have opposite leaves and green twigs. No other vine has buds arranged as in Bittersweet. See Asiatic Bittersweet.

Remarks: Collection of Bittersweet for commercial sale has much reduced or exterminated it in many areas. Fruits eaten by songbirds, ruffed grouse, pheasant, bobwhite, and fox squirrel. Cottontail eats twigs and bark.

ASIATIC BITTERSWEET **Not illus.**
Celastrus orbiculatus Thunb.

Recognition: Similar to American Bittersweet but with leaves nearly circular. Escaped from cultivation; New York southward.

SUPPLEJACK *Berchemia scandens* (Hill) K. Koch **p. 308**

Recognition: A southern high-climbing vine, often large. Elliptic leaves have distinctively straight, *parallel side-veins.* Fine leaf teeth may be present or lacking. Leaf scars much raised; bundle scar single. Buds sharp, hug twigs. Leaves 1″–4″. Flowers greenish white, April–June. Fruits blue, single-seeded, July–Oct.

Remarks: Fruits eaten by numerous birds, including wood duck, mallard, bobwhite, and wild turkey.

EUROPEAN MATRIMONY-VINE **p. 308**
Lycium halimifolium Mill.

Recognition: A low scrambling vine or upright shrub. Stems *ridged* and usually somewhat *thorny.* Leaves gray-green, narrow or wedge-shaped, not toothed, often in small clusters. Pith solid; stems and buds hairless. Buds have 2–3 scales; bundle scar single. Leaves ½″–2″. Flowers small, greenish purple, June–Sept. Fruits red berries, ⅜″–³⁄₁₆″, Aug.–May.

Similar species: Some greenbriers (Plate 33) conceivably might be confused with this thorny species but they have tendrils and climb high. (1) Scotch Broom (Plate 25) has mostly trifoliate leaves; it is not thorny and twigs are green. (2) See next species.

Remarks: Leaves and young shoots of this European introduction contain an alkaloid reportedly dangerous to sheep and cattle.

CHINESE MATRIMONY-VINE **Not illus.**
Lycium chinense Mill.

Recognition: Similar to the European species but less thorny; leaves dark green, wider, and less often clustered. Fruits usually larger. Flowers June–Oct. Whin (p. 295) has more finely lined stems and yellow blossoms. Waste places; Massachusetts and Michigan to Virginia, Louisiana, and Oklahoma.

BITTER NIGHTSHADE *Solanum dulcamara* L. **p. 308**

Recognition: A low scrambling or climbing vine with ridged stems and hollow pith. Leaves *long-pointed* and either *with or without basal lobes.* Typically hairless. The widespread variety

villosissimum Desv. has hairy stems and leaves. Bundle scar single. Leaves 1″–5″. Flowers purple, rarely white, May–Sept. Fruits red berries, Aug.–May.
Similar species: Only other twining vines with hollow pith are the opposite-leaved honeysuckles (Plate 13).
Remarks: This relative of the potato, tomato, and eggplant sometimes transmits diseases and insect pests of those plants. Fruits eaten by birds including ruffed grouse, pheasant, bobwhite, and black duck. Stems browsed by cottontail rabbit. Livestock have been poisoned, however, upon eating foliage.

DUTCHMAN'S-PIPE *Aristolochia durior* Hill **p. 308**
Recognition: A high climbing vine with large *hairless heart-shaped* leaves and round green stems. Buds woolly, often in groups above leaf scars; hidden by leafstalks during warm months. Bundle scars 3 per leaf scar. Leaves 4″–10″. Flowers long, curved, pipelike, brownish purple, May–June. Fruits dry capsules, 2″–3″, Sept.
Similar species: Clustered woolly buds and large heart-shaped leaves distinguish pipe-vines. Next species is hairy.

WOOLLY PIPE-VINE *Aristolochia tomentosa* Sims **p. 308**
Recognition: Somewhat more southern and western than Dutchman's-pipe. Leaf undersides, twigs, and flowers *hairy;* leaf tips more blunt. Flowers yellow and purple, May–June. Fruits all year.

Miscellaneous Upright Thorny Plants

(*Plate 38, p. 310*)

The only other thorny or prickly upright woody plants with alternate leaves are the hawthorns (Plate 39), the gooseberries and a currant (Plate 40), which follow this account, and the compound-leaved species given earlier (Plates 23 and 24). The only opposite-leaved thorny plant is the Common Buckthorn (Plate 19). Spur branches, present in all members of this group except Firethorn and Devil's-club, are stubby, leaf-scar-crowded offshoots of the older branches. They may bear dense clusters of leaves in summer. Bundle scars are 3 per leaf scar except in Osage-orange.

OSAGE-ORANGE **pp.** ***13,*** **310**
Maclura pomifera (Raf.) Schneid.
Recognition: A medium-sized tree. Leaves egg-shaped, somewhat *long-pointed, not toothed.* Strong unbranched thorns at each leaf scar. Sap *milky* (Caution: it causes a rash in some people). Wood *yellow.* Buds nearly ball-shaped; end ones false.

Bundle scars 1 to more than 3. Bark orange-brown, furrowed, tight, fibrous. Spur branches of clustered leaves often present. Leaves 1″–8″. Height 50′–60′; diameter 18″–36″. Flowers May–June. Fruits green, *wrinkled, grapefruit-sized,* Oct.

Similar species: This species and the bumelias are the only thorny plants with milky sap. Small specimens differ from bumelias in having false end buds and in leaf shape. Barberries have yellow wood but thorns are mostly branched; shrubby, with sap not milky, and fruits are red berries.

Remarks: Once native in northern Texas, se. Oklahoma, and nearby Arkansas, home of Osage Indians, this species was widely planted for living fences before invention of barbed wire. Because of its use in making bows, French name *bois d'arc* (colloquially Bodarc, Bodock) is still heard. Bark yields tannin; boiled wood chips yield yellow dye.

EASTERN BUMELIA *Bumelia lycioides* (L.) Gaertn. f. **p. 310**

Recognition: A shrub to small tree with sharp thorns at buds. Leaves narrow to elliptic or even parallel-sided or egg-shaped, *without teeth,* tips *short-pointed* or rounded, either hairless or somewhat silky. Spur branches with crowded leaves; leaf scars often present. Sap *milky.* Buds ball-like; true end buds present. Leaf blades 2½″–6″. Height to 30′. Flowers small, white, clustered, June–July. Fruits small, cherrylike, black, Sept.–Nov.

Similar species: (1) See Osage-orange. (2) Small Bumelia is lower, with smaller, more leathery leaves. (3) Woolly Bumelia has hairy leaves.

Remarks: Frequently used name Buckthorn may be confused with buckthorns of genus *Rhamnus* (Plates 19 and 58).

SMALL BUMELIA *Bumelia smallii* R. B. Clark **Not illus.**

Recognition: Similar to Eastern Bumelia but shrubbier, with leathery leaves having blades not more than 2½″. Sometimes considered merely a variant of Eastern Bumelia. Bottomlands; se. Missouri to Louisiana and e. Texas.

WOOLLY BUMELIA **Not illus.**

Bumelia lanuginosa (Michx.) Pers.

Recognition: Similar to Eastern Bumelia but wedge-shaped or parallel-sided leaves *rusty-hairy* beneath. Twigs and buds *woolly.* Leaves 1″–4″. Height to 50′ but usually shrubby. Sandy soils; s. Illinois, centr. Missouri, se. Kansas to n. Florida, Texas, and s. Arizona.

FIRETHORN *Cotoneaster pyracantha* (L.) Spach **p. 310**

Recognition: A European shrub with narrow, *wavy-edged* leaves that have wedge-shaped bases and rounded tips. Leaves thick, usually evergreen. Spur branches lacking, short thorns *not*

branched, sap not milky. End buds true. Leaves ½″–2″. Height to 10′. Flowers small, white, clustered, May–June. Fruits small, *bright orange,* clustered, usually present all winter.
Similar species: Evergreen wavy-edged leaves and colorful fruits are distinctive. Hawthorns, if evergreen, have much longer thorns, usually sharply toothed leaves, and larger fruits.
Remarks: Fruits regularly eaten by many birds and mammals.

AMERICAN BARBERRY *Berberis canadensis* Mill. **p. 310**
Recognition: A low shrub whose wedge-shaped leaves are sharply but *widely toothed.* Twigs brown and rough-warty; thorns usually with *2 side branches* as long as central spine. Inner bark and wood *yellow;* spur branches may be present. Sap not milky. Leaves 1½″–3″. Height to 5′. Flowers yellow, May–June. Fruits red, ball-like, Sept.–winter.
Similar species: (1) Only other native thorny plant with yellow wood is much taller Osage-orange, which has milky sap and unbranched thorns. (2) European Barberry has closer bristle-tipped teeth. (3) Japanese Barberry leaves not toothed.
Remarks: Although named *canadensis,* does not occur naturally in Canada. An alternate host for the wheat black stem rust.

EUROPEAN BARBERRY *Berberis vulgaris* L. **Not illus.**
Recognition: Has escaped in some areas. Leaves more *closely bristle-toothed* than in American Barberry. Thorns *branched* like those of American Barberry. Taller, looser arrangement of branches helps in winter to separate this from Japanese species. Twigs *gray,* not roughened by numerous fine warts as in American Barberry. Inner bark and wood yellow. The most susceptible of all barberries to black stem rust of wheat. Leaves ½″–3″. Height to 10′. Flowers yellow, May–June. Fruits red, longer than broad, Aug.–spring. Thickets; Nova Scotia and Minnesota to Delaware and Missouri.
Remarks: Birds including ruffed grouse, bobwhite, and pheasant eat fruits.

JAPANESE BARBERRY *Berberis thunbergii* DC. **Not illus.**
Recognition: A low compact oriental shrub with wedge-shaped leaves that are *not toothed.* Twigs *brown,* somewhat ridged; thorns either *unbranched* or with 2 small side branches; inner bark and wood yellow. Only barberry in this area which does not transmit stem rust of grains. See American Barberry. Leaves ½″–1½″. Height to 5′. Flowers yellow, April–May. Fruits red, long or globular, often present through winter. Escaped from cultivation to pastures, open habitats; Nova Scotia and Michigan to N. Carolina and Missouri.
Remarks: Fruits eaten by many birds, including ruffed grouse, bobwhite, and pheasant.

WILD PLUMS *Prunus* spp. **p. 310**

Recognition: Though the cherries, also in the genus *Prunus*, are never spiny, the plums are variously thorny or not. Alleghany Plum (p. 240), for example, sometimes has spine-tipped twigs. For upright cherries and such usually thornless plums see Plate 53. Some spines of plums may be simple spikes, but most are short, stiff, bud-bearing branches with sharpened tips. Thorns are generally absent from young twigs. Like other species of *Prunus*, leafstalks of most plums (but see American Plum) bear paired small glands. Sap clear and spur branches often present. Bark often marked with horizontal line-like lenticels. Unlike cherries, the end buds are false in plums. Wild plum fruits are small, ball-shaped, with single large seeds.

The several plums that regularly bear thorns usually may be separated by the following key, but also see species accounts:

- **1.** Twigs hairless or nearly so:
  - **2.** Leaf scars raised but not hiding any large part of the buds:
    - **3.** Buds red-brown, mostly about ⅛″ long **AMERICAN PLUM**
    - **3.** Buds gray or blackish, mostly 3/16″ long **CANADA PLUM**
  - **2.** Leaf scars raised, hiding the lower half of the buds **CHICKASAW PLUM**
- **1.** Twigs velvety-hairy or woolly:
  - **4.** Buds longer than broad:
    - **5.** Leaf teeth rounded **BULLACE PLUM**
    - **5.** Leaf teeth sharp **AMERICAN PLUM**
  - **4.** Buds shorter than broad **SLOE PLUM**

AMERICAN PLUM *Prunus americana* Marsh. **p. 310**

Recognition: A shrub or small tree with *shaggy bark.* Leaves narrow to wedge-shaped, hairless or nearly so (except in var. *lanata*), somewhat long-pointed, sharply and often doubly toothed. Usually no glands on leafstalks. Twigs typically hairless but var. *lanata* Sudw. (Indiana and Iowa to Tennessee, Arkansas, and Texas) has hairy twigs and leaf undersides. Buds *red-brown,* mostly about ⅛″. Leaf scars not abnormally enlarged. Leaves 1″–5″. Height 15′–30′ (35′); diameter 5″–10″ (14″). Flowers white, 3–5 in clusters, April–June. Fruits red or yellow, ⅞″–1¼″, seed somewhat flattened, Aug.–Oct.

Similar species: Only thorny plum to have sharp leaf teeth and regularly to lack glands on leafstalks.

Remarks: Several hundred varieties have been named. Some are cultivated.

CANADA PLUM *Prunus nigra* Ait. **Leaf edge illus., p. 310**

Recognition: Similar to American Plum but leaf teeth *rounded* and *glands* on leafstalks usually present. Twigs hairless; buds *gray* or blackish, about 3⁄16″. Numerous strains known and several cultivated. Leaf scars not abnormally enlarged. Bullace Plum is similar but hairy. Leaves 1″–5″. Height 6′–20′ (25′); diameter 4″–10″ (12″). Flowers white to pink, April–June. Fruits yellow to reddish, slightly elongate, Aug.–Oct. Thickets; Nova Scotia, s. Quebec, s. Ontario, n. Michigan, and s. Manitoba to Virginia, W. Virginia, Ohio, n. Illinois, and Iowa; in mountains to Georgia.

CHICKASAW PLUM **Not illus.**
Prunus angustifolia Marsh.

Recognition: A southern shrub or small tree with hairless narrow leaves with fine, gland-tipped, rounded teeth. Toward southwest, leaves become wider and somewhat leathery. Leafstalks bear glands. Twigs hairless, *reddish.* Leaf scars *raised* to such an extent that lower halves of buds are hidden. Leaves 1″–3″. Height to 20′; diameter to 10″. Flowers white, clustered, March–April. Fruits red or yellow, seeds nearly spherical, July–Aug. Thickets; New Jersey, Maryland, Kentucky, s. Illinois, and s. Nebraska to centr. Florida and centr. Texas.

BULLACE PLUM *Prunus insititia* L. **Not illus.**

Recognition: European; similar to Canada Plum but with *velvety* leaf undersides, twigs, and flower and fruit stalks. Leaf bases somewhat wedge-shaped. Buds longer than broad. Sloe Plum has shorter buds, single blossoms. Leaves 2″–4″. Height to 20′. Flowers mostly in pairs, white, over 7⁄8″ across, April–May. Fruits blue-black, with a bloom, spherical, Aug.–Sept. Escaped from cultivation; local in se. Canada and ne. U.S.

SLOE PLUM *Prunus spinosa* L. **Not illus.**

Recognition: Similar to Bullace Plum but more spiny and with smaller leaves. Buds shorter than broad. Flowers mostly single and only 3⁄8″–5⁄8″ across. Flower and fruit stalks hairless. Eurasian; occasionally spreading from cultivation; se. Canada and ne. U.S.

NATIVE CRABAPPLES *Pyrus* spp. **p. 310**

Recognition: The apples differ from the plums in having true end buds, no glands on leafstalks, scaly nonstriped bark, and several-seeded fruits. Some hawthorns (Plate 39) have thorns, leaves, and fruits resembling those of apples but their thorns never bear buds or leaves and their thorns occur on the twigs, not on older wood as in apples (or plums). Spur branches occur in all 3 groups.

Some apples are more regularly spiny than others. These are the ones discussed here. They are the only apples native to our area. The imported crabapples, apples, and pears are less likely to be thorny and are given on Plate 58. Since they may be spiny, however, the text discussion also should be seen in identifying members of the group. Hybrids between species are frequent and usually have intermediate characteristics.

The related mountain-ashes (Plate 27) and chokeberries (Plate 58) are also included in the genus *Pyrus* but are quite distinctive. Identification of the apples and pears, including those on Plate 58 (marked °), may be made as follows:

- **1.** Twigs and leaf undersides usually hairy to woolly:
  - **2.** Leaf teeth rounded; leaves never deeply cut **DOMESTIC APPLE°**
  - **2.** Leaf teeth sharp; leaves on vigorous shoots often deeply toothed or lobed:
    - **3.** Leaf bases rounded:
      - **4.** Northeast area; leaves barely hairy; fruits without grit cells **CHINESE APPLE°**
      - **4.** Midwest area; leaves densely woolly; fruits without grit cells **PRAIRIE CRABAPPLE**
      - **4.** Southeast area; leaves often densely woolly; fruits with grit cells **CHINESE PEAR°**
    - **3.** Leaf bases wedge-shaped; southeast area; a variety of the **NARROWLEAF CRABAPPLE**
- **1.** Twigs and leaf undersides usually hairless or nearly so:
  - **5.** Leaf teeth rounded; leaves never deeply cut **DOMESTIC PEAR°**
  - **5.** Leaf teeth sharp:
    - **6.** Leaves long-pointed:
      - **7.** Leaves not deeply cut **SIBERIAN CRABAPPLE°**
      - **7.** Leaves on vigorous shoots often deeply toothed or lobed; a variety of **AMERICAN CRABAPPLE**
    - **6.** Leaves not long-pointed, often deeply toothed or lobed:
      - **8.** Leaf bases wedge-shaped, tips blunt; southeastern **NARROWLEAF CRABAPPLE**
      - **8.** Leaf bases rounded, tips sharp, north-central **AMERICAN CRABAPPLE**

AMERICAN CRABAPPLE *Pyrus coronaria* L. **p. 310**

Recognition: A thicket-forming shrub or small tree with hairless twigs and leaves. Leaves have *round bases,* sharp tips. Those on vigorous shoots deeply toothed to somewhat lobed. Though usually heart-shaped to triangular, foliage of var. *lancifolia* (Rehd.) Fern. (Pennsylvania and Illinois to w. N. Carolina, Tennessee, and Missouri) is narrowly long-pointed. Buds sharp-pointed. Bark gray, rough, cracked vertically. Leaves 1″–5″. Height 15′–30′; diameter 6″–14″. Flowers pink or white, highly fragrant, March–May. Fruits yellow-green, 1″–2″, bitter, Sept.–Nov.

Similar species: (1) Narrowleaf Crabapple has leaves more elliptic. (2) Prairie Crabapple is woolly.

Remarks: Widely planted for ornament. Fruits used in preserves and vinegar; trunks used as stock on which to graft less hardy cultivated apples.

NARROWLEAF CRABAPPLE **Not illus.**

Pyrus angustifolia Ait.

Recognition: Similar to American Crabapple but with elliptic leaves, leaf bases more wedge-shaped and tapering, and leaf tips usually rather blunt. Leaves tend to be evergreen in some areas, but even where this is not true dead leaves often can be found to assist in winter identification. Fruits 1″–1½″, bitter, but used for preserves and cider. Widespread variety *spinosa* (Rehd.) Bailey is quite woolly. Coastal Plain woods and thickets; Maryland to Florida, west to Louisiana; and north in Mississippi Valley to s. Illinois and Arkansas.

PRAIRIE CRABAPPLE **Not illus.**

Pyrus ioensis (Wood) Bailey

Recognition: Midwestern. Similar to American Crabapple but twigs and leaf undersurfaces densely woolly. Flowers April–May. Thickets and open places; Indiana, se. Minnesota, and se. Nebraska to Louisiana and centr. Texas.

DEVIL'S-CLUB *Oplopanax horridus* (Sm.) Miq. **Not illus.**

Recognition: Related to Hercules-club (Plate 24). Twigs, branches, stems, and leafstalks of this straggling shrub *covered with slender thorns.* Leaves 4″–12″ across, fan-lobed, with 3–11 toothed lobes. Leaf veins prickly beneath. Nothing else like it. Flowers July–Aug. Fruits red, Aug.–Oct. Rocky places; from Alaska to w. Ontario, Isle Royale (Michigan), Montana, and California.

Hawthorns

(*Plate 39, p. 312*)

HAWTHORNS *Crataegus* spp. **p. 312**

Recognition: These plants, distinctive though they are as a group, are virtually indistinguishable as species except by the few botanists who have given the genus special study. Frequent hybridization complicated by great individual variation con-

clusters of numerous flowers and fruits. The only other thorny shrubs with maplelike leaves are the coarse Devil's-club (p. 197), with thorny leaf ribs, and a few hawthorns (Plate 39), with ball-shaped buds.

Gooseberries and currants act as intermediate hosts in transmitting blister rust disease from one 5-needled pine to another. They have been instrumental in causing extensive forest damage by this disease and have been eradicated from some areas.

As food, the fleshy berries are enjoyed by nearly all birds and mammals that are not strictly carnivorous. Aside from numerous songbirds, they have been recorded in our area as eaten by mourning dove, spruce, ruffed, and sharptail grouse, bobwhite, pheasant, coyote, skunk, cottontail rabbit, red squirrel, and several chipmunks and ground squirrels. Twigs and bark are eaten by whitetail deer, moose, and porcupine. Jams and jellies are commonly made from wild fruits for human consumption.

Characteristics are not available for naming all species in winter, but the restricted geographic ranges of some are of assistance.

BRISTLY BLACK CURRANT **p. 314**
Ribes lacustre (Pers.) Poir.

Recognition: A bristly shrub with *many prickles* as long (about ¼") as the weak thorns. Leaves nearly hairless; lobes *more deeply cut* than in most other *Ribes*. Twigs red-brown, usually have *foul odor* when broken. Leaves ½"–4". Height to 5′. Flowers small, green or purple, May–Aug. Fruits purplish, bristly, foul-smelling when broken, hardly edible, July–Sept.

Similar species: (1–3) The next 3 frequently have prickles as well as thorns. However, they have either hairy leaves or long thorns and may have red fruits. (4) See Smooth Gooseberry.

CANADA GOOSEBERRY **Not illus.**
Ribes oxyacanthoides L.

Recognition: A low northern species with many weak prickles on the twigs between the slightly longer (⅛"–5⁄16") and stouter thorns. Leaves somewhat glandular-hairy, at least beneath. Rock Gooseberry has longer thorns. A hairy variety of Smooth Gooseberry lacks glands. Leaves ½"–4". Height to 3′. Flowers purple, May–July. Fruits purplish, smooth, tasty, June–Sept. Woods and wet places; n. Ontario and Yukon to n. Michigan, n. Minnesota, S. Dakota, and Montana.

ROCK GOOSEBERRY *Ribes setosum* Lindl. **Not illus.**

Recognition: Bristly like Canada Gooseberry but with thorns, if present, up to 13⁄16". See Smooth Gooseberry. Flowers white. Fruits red or black, sometimes glandular-hairy. Rocky soils; n.-centr. Ontario, Manitoba, and Alberta to n. Michigan, Wisconsin, Nebraska.

PASTURE GOOSEBERRY *Ribes cynosbati* L. **p. 314**

Recognition: A variable shrub normally *without bristles* between thorns but occasionally with them (var. *atrox* Fern.), especially on Manitoulin I., Ontario. Thorns ¼″–⅜″ but rarely (forma *inerma* Rehd.) both thorns and prickles lacking. Leaves *soft-hairy* except in a hairless variety—*glabratum* Fern. (Ohio and Michigan to w. Virginia and N. Carolina). Twigs *gray to dark brown.* Leaves ½″–4″. Height to 5′. Flowers greenish, May–June. Fruits red-purple, covered with long spines, sweet, July–Sept.

Similar species: Where prickles are lacking, short thorns, hairy leaves, and reddish fruits are distinctive. Hairless and thornless varieties difficult to identify unless fruits present. See Smooth Gooseberry.

MISSOURI GOOSEBERRY *Ribes missouriense* Nutt. **p. 314**

Recognition: A stout-thorned shrub. Thorns 5⁄16″–11⁄16″, *strong* and *usually red.* Leaves hairless or nearly so. Leaves 2″–4″. Height to 7′. Flowers whitish, April–May. Fruits black, smooth, June–Sept.

Similar species: No other nonbristly gooseberry has such large thorns.

EUROPEAN GOOSEBERRY *Ribes grossularia* L. **p. 314**

Recognition: Similar to Missouri Gooseberry but thorns ⅜″–⅝″, flowers green, and fruits green or red and hairy or somewhat bristly. Escaped from gardens in scattered localities.

ROUNDLEAF GOOSEBERRY **p. 314**
Ribes rotundifolium Michx.

Recognition: An eastern short-thorned shrub with somewhat *round-lobed* leaves hairless or less commonly slightly hairy beneath. Thorns 1⁄16″–¼″. Leafstalks have *unbranched* hairs (use lens); buds mostly under ⅛″. Leaves ½″–4″. Height to 3′. Flowers green to purple, April–June. Fruits blackish, smooth, tasty, June–Sept.

Similar species: The next has branched hairs on leafstalks, longer buds, more pointed leaf lobes, more northern distribution.

SMOOTH GOOSEBERRY *Ribes hirtellum* Michx. **p. 314**

Recognition: A northern short-thorned shrub with rather *pointed* leaf lobes. Thorns ⅛″–5⁄16″; new shoots may be prickly between thorns. Leaves typically hairless but var. *calcicola* Fern. has foliage velvety beneath. Leafstalks have *branched* hairs (use lens); buds mostly over 3⁄16″. Leaves ½″–4″. Height to 3′. Flowers green to purple, April–July. Fruits blackish, smooth, tasty, June–Sept.

Similar species: When prickles are present between thorns this may resemble (1) Bristly Black Currant, (2) Canada, (3) Rock, and (4) Pasture Gooseberries. Differs from Bristly Black Currant in that broken twigs and fruits do not have foul odor and fruits are not bristly. Canada Gooseberry has hairy leaves and is not easily distinguishable from hairy variety of this species when it also is prickly, but Smooth Gooseberry lacks glands mixed in hair of leaves. Rock Gooseberry has longer thorns or none, and red fruits. (5) Roundleaf Gooseberry has unbranched hairs on leafstalks. (6) American Black Currant (Plate 41) is resin-dotted. (7) Golden Currant has hairy twigs (Plate 41).

Thornless Currants

(Plate 41, p. 316)

These differ from the *Ribes* of Plate 40 in being thornless. The group may be identified by the characteristics mentioned on page 198. Short spur branches with clustered leaves and leaf scars also may be useful in identification.

AMERICAN BLACK CURRANT **p. 316**
Ribes americanum Mill.

Recognition: An upright shrub with both leaf surfaces, twigs, buds, flower ovaries, and fruits *resin-dotted.* These dots appear as tiny bright yellow droplets when viewed through hand lens. Leaves double-toothed, somewhat hairy beneath. Twigs not foul-smelling when broken; marked with *ridges* leading down from centers of leaf scars, and hairless or nearly so. Leaves ½″–4″. Height to 5′. Flowers yellow or white, clusters drooping, April–June. Fruits black, smooth, resin-dotted, June–Sept.
Similar species: (1) European and (2) Canadian Black Currants also have resin-dotted foliage but these dots are lacking on upper leaf surface. Their twigs are not ridged. (3) Smooth Gooseberry (Plate 40) in thornless condition lacks resin-dots.

EUROPEAN BLACK CURRANT *Ribes nigrum* L. **p. 316**

Recognition: Like American Black Currant but resin-dots *absent* from *upper* leaf surface and fewer on twigs and buds. Broken twigs have *strong unpleasant odor.* No lines from leaf scars. Twigs somewhat hairy. Leaves ½″–4″. Height to 5′. Flowers yellow, white, or purplish, clusters drooping.
Similar species: See next species.

CANADIAN BLACK CURRANT **Not illus.**
Ribes hudsonianum Richards.

Recognition: Like European Black Currant but more northern and western. Flowers always white. Flower and fruit clusters more or less upright. Leaves ½″–6″. Height to 3′. Flowers

May–July. Fruits July–Aug. Wet places; n. Quebec and Alaska to Michigan, ne. Iowa, s. Manitoba, Saskatchewan, Wyoming, Utah, and Oregon.

GOLDEN CURRANT *Ribes odoratum* Wendland f. **p. 316**
Recognition: A rather tall western currant *without* resin-dots. Leaves *rarely* heart-shaped at base; either hairy or hairless beneath. Twigs *hairy* without foul odor when broken. Leaves ½″–4″. Height to 10′. Flowers *golden yellow*, spicy-scented, April–June. Fruits *black*, rarely yellow, smooth, June–Aug.
Similar species: Only 2 currants are thornless, upright, and lack resin-dots: this and Garden Red Currant. Differs from next in having hairy twigs, yellow flowers, and nonred fruits.

GARDEN RED CURRANT *Ribes sativum* Syme **p. 316**
Recognition: An upright or sometimes somewhat reclining shrub *without* resin-dots; leaves *usually* heart-shaped at base, not deeply lobed, either hairy or hairless beneath. Twigs *hairless*, without foul odor when broken. Leaves ½″–4″. Height to 5′. Flowers *yellow-green*, not spicy-scented, May. Fruits red, smooth, juicy, June–July.
Similar species: (1) See Golden Currant. (2) Swamp Red Currant has rooting branches and small fruits.

SKUNK CURRANT *Ribes glandulosum* Grauer **p. 316**
Recognition: A low spreading or sprawling shrub with all parts giving off a *skunklike odor* when crushed. Leaves rather deeply divided with *5–7 lobes*, double-toothed and hairless. Twigs pale brown, hairless; buds green or purplish. Leaves ½″–4″. Height to 6′. Flowers white or pink, May–Aug. Fruits red, sticky-bristly, June–Sept.
Similar species: (1) Swamp Red Currant also is a straggling swamp currant but lacks foul odor and has hairy leaves averaging fewer lobes, gray-brown buds, and smooth fruits. (2) Garden Red Currant occurs on drier soils and lacks skunky odor.

SWAMP RED CURRANT *Ribes triste* Pall. **p. 316**
Recognition: A straggly shrub with branches often along ground and taking root. Leaves *3- to 5-lobed*, double-toothed, *usually hairy* beneath, varying from white-woolly to hairless. Twigs grayish and hairless; buds brownish. Leaves ½″–6″. Height to 3′. Flowers gray to purplish, April–July. Fruits red, smooth, small, hard, June–Aug.
Similar species: (1) Skunk Currant is foul-smelling. (2) Garden Red Currant occasionally not upright but its branches do not take root, fruits are large and juicy, and it occurs in fields, openings.

Miscellaneous Plants with Fan-lobed Leaves

(*Plate 42, p. 318*)

The mulberries and Sassafras (Plate 43) possess leaves frequently deeply lobed, but they also usually carry some unlobed foliage. White Poplar (Plate 44) has leaves rarely lobed but white-woolly. Sand and Bush Grapes (Plate 34) have lobed leaves and may be bushy, but they usually look somewhat vinelike and their stem pith is divided by partitions near the places of leaf attachment. These species, most currants (Plate 41), and the following few plants are the only alternate-leaved trees and shrubs that are thornless and possess leaves fan-lobed. The species of this plate lack the long lines descending from leaf scars which are present in the currants. Maples (Plate 22) and some viburnums (Plates 20 and 21) have fan-lobed leaves but these are opposite, not alternate.

TULIP-TREE *Liriodendron tulipifera* L. **pp.** *7,* **318**

Recognition: A straight tall tree with peculiar *notched-tip, 4-pointed* hairless leaves. Pairs of large leafy stipules attach to twigs and enclose buds. Twigs hairless with *completely encircling lines* (stipule scars) at leaf scars. Pith chambered. Only 2 bud scales cover each end bud; side buds small or indistinct. Crushed buds and leaves spicy-aromatic; bundle scars more than 3. Bark light gray, *often whitened* in grooves and in patches on younger bark. Leaves 6″–10″. Height 50′–100′ (190′); diameter 2′–6′ (10′). Flowers large, *tuliplike,* orange and green, May–June. Fruits slim, winged, whitish, 1″–2″, clustered upright in conelike structure about 3″ long, Sept.–Nov., or longer; often central stalks of cones remain throughout winter and are evident on higher limbs.

Similar species: None; distinctive at all seasons.

Remarks: Tallest and in many ways handsomest eastern forest tree. Second only to Sycamore in trunk diameter. Wood straight-grained, fine, soft, resistant to splitting and easily worked. Used for furniture, interiors, shingles, boats, implements, boxes, toys, pulp, and fuel. Indians made trunks into dugout canoes. Seeds eaten by squirrels and songbirds. Though widely known as Yellow Poplar and Tulip Poplar, this relative of magnolias (Plate 49) is not closely related to true poplars (Plate 44).

SWEETGUM *Liquidambar styraciflua* L. **pp.** *13,* **318**

Recognition: A tall tree with peculiar *star-shaped,* toothed hairless leaves. Leaves may be *5- or 7-lobed;* pleasantly fragrant when crushed. Twigs not ringed; branchlets often corky-winged. Stubby "spur" branches densely covered by leaf scars or crowded leaves. Bud scales numerous and hairy-fringed; bundle scars 3; pith continuous. Mature bark grayish, regularly grooved. Leaves 5″–8″. Height 50′–120′ (140′); diameter 3′–4′ (5′). Flowers in spherical heads, April–May. Fruits in brown, dry, somewhat *prickly, long-stemmed, hanging balls,* Sept.–Nov., or longer.

Similar species: None in summer. In winter some elm twigs may have corky wings present but those species have false end buds and their bud scales have dark borders without a hairy fringe.

Remarks: Both common and scientific names allude to the sap that exudes from wounds. Hardened clumps of this gum are chewed by some people. Because Sweetgum veneer takes a high polish, it is widely used for furniture. Lumber also used for interiors, woodenware, boats, toys, boxes, and fuel. Seeds eaten by songbirds, bobwhite, wild turkey, chipmunks, and gray squirrel.

SYCAMORE *Platanus occidentalis* L. **pp.** *10,* **318**

Recognition: A very large lowland tree with distinctive mottled brown *bark* that flakes off in jigsaw-puzzle-like pieces, exposing *yellowish and whitish underbark.* Leaves nearly hairless, *3- to 5-lobed,* edged with large teeth. Leafstalk bases hollow, covering buds; leaf scars *surround* buds. Single saucerlike, leafy, toothed stipules *clasp and encircle twigs* at points of leaf attachment; stipule scars ring winter twigs. Buds covered by a single scale; end buds false. Bundle scars many. Leaves 6″–10″. Height 50′–130′ (175′); diameter 3′–8′ (14′). Flowers small, in *globose* heads, April–June. Fruits small and hairy, in tight, brown, long-stalked hanging balls ¾″–1½″ in diameter, Oct., often through winter.

Similar species: Old World Sycamores, often planted in our cities, are called Plane-trees. They usually have 2 or more fruit "balls" per stalk rather than 1 and have more yellowish underbark.

Remarks: Tulip-tree occasionally may be taller, but Sycamore is generally conceded to be the most massive tree of eastern U.S. Attains greatest size in Ohio and Mississippi river basins, but, unlike Sequoias and Redwoods of California, is old at 500–600 years. Hard coarse-grained wood used for boxes, barrels, butchers' blocks, cabinetwork, and furniture. Indians used trunks for dugouts. One such canoe reported to have been 65′ long and to have weighed 9000 pounds. Twigs eaten by deer and muskrats. Cavities sought for nests and shelter by wood duck, opposum, and raccoon.

ROSE-OF-SHARON *Hibiscus syriacus* L. **p. 318**

Recognition: Shrub with *3-lobed, round-toothed* leaves hairy beneath. Twigs often somewhat hairy, with tips expanded. Buds very small, white-hairy, clustered toward twig tips. End buds true; bundle scars more than 3. Tiny pointed stipules flank bases of leafstalks. Leaves 2″–6″. Height to 18′. Flowers large, hollyhocklike, pink, July-Sept.

Similar species: Ninebark has visible buds, twig tips not expanded, and shreddy older bark.

FLOWERING RASPBERRY *Rubus odoratus* L. **p. 318**

Recognition: A thornless rambling shrub. Leaves *maplelike,* but alternate, 3- to 5-lobed, toothed, varying from nearly hairless to velvety-hairy. Leaves in autumn break off above leaf bases, which remain on twig. No bundle scars evident unless leaf base is sharply cut across, whereupon 3 bundle scars can be discerned. Twigs usually quite hairy but occasionally nearly hairless. Hairs on leaves, twigs, and flowers often *clammy-tipped* (use lens). Twig tips usually wither back in winter; no end buds apparent. Older bark papery. Leaves 4″–15″. Height to 5′. Flowers *rose-purple,* rarely white, 1″–2″, June–Sept. Fruits red, rather *dry* and tasteless, July–Sept.

Similar species: Thimbleberry is more western, has white flowers. Only other shrubs with leaves distinctly maplelike but alternate are currants and gooseberries (Plates 40 and 41), which have obvious buds, less sharp leaf teeth, and often bear thorns. In winter no other shrubs, except prickly brambles (Plate 23), have persistent leaf bases without readily evident bundle scars.

Remarks: Fruits are eaten by great variety of wild animals.

THIMBLEBERRY *Rubus parviflorus* Nutt. **Not illus.**

Recognition: Similar to Flowering Raspberry but more western and with white blossoms. Twigs and flower parts are rarely clammy. Fruits *juicy,* used in making jelly, but not particularly tasty raw. Woods and thickets; w. Ontario, n. Michigan, Minnesota, sw. S. Dakota, and s. Alaska to Mexico, Arizona, and California.

NINEBARK *Physocarpus opulifolius* (L.) Maxim. **p. 318**

Recognition: A shrub with *3-lobed,* round-toothed, hairless leaves. Twigs hairless; buds many-scaled. Bundle scars 3–5; leaf scar distinctly raised, with 3 descending lines. Bark of older branches *papery* and shreddy. Leaves 1″–5″. Height to 10′. Flowers small, white, in umbrellalike clusters, May–July. Fruits small dry bladders, Sept.–often through winter.

Similar species: Twigs and papery bark of some currants (Plate 41) similar in winter but their leaf scars more narrow, less raised, and mostly without a 3rd center line descending from the leaf scars. Currant fruits, furthermore, are fleshy. See Rose-of-Sharon (p. 205).

Plants with Leaves Fan-lobed or Fan-veined

(Plate 43, p. 320)

These plants have leaves that are either lobed or not. Usually, when in leaf both lobed and unlobed foliage is present at the same time. When unlobed, the leaves generally are heart-shaped. All these species have distinctly fan-veined leaves, with 3–5 main veins meeting near the ends of the leafstalks. The number of bundle scars per leaf scar varies by species.

PAPER-MULBERRY **p. 320**
Broussonetia papyrifera (L.) Vent.

Recognition: A medium-sized Asiatic tree with *sandpaper-textured* leaves and twigs. Leaves fine-toothed, varying from heart-shaped to deeply and intricately lobed, "sandpapery" above and velvety below. Twigs *rough-hairy;* buds have only 2–3 visible scales. Sap *milky* (not always evident in winter). Bundle scars more than 3 per leaf scar. Pith blocked by a woody partition near each bud. End buds false. Bark a *yellow-brown* smooth network of fine ridges. Leaves 4″–11″. Height to 50′; diameter to 4′. Flowers April–May. Fruits red, fleshy, barely edible, Sept.

Similar species: No other plant has such rough leaves and twigs.

Remarks: Fibrous inner bark, especially of roots, can be twisted into improvised ropes and lines in this and next several species.

RED MULBERRY *Morus rubra* L. **p. 320**

Recognition: A native tree whose fine-toothed leaves are somewhat "*sandpapery*" above and *hairy* beneath. Foliage often lobed. Twigs *hairless* or slightly hairy. Buds have 5–6 visible scales, greenish brown with darker scale borders; end buds false. Sap of twigs and leafstalks *milky.* Bundle scars more than 3 per leaf scar. Pith continuous. Trunk bark *red-brown* with smooth ridges. Leaves 3″–10″. Height 30′–60′ (80′); diameter 1′–3′ (4′). Flowers April–June. Fruits red-black, blackberrylike, tasty, June–July.

Similar species: White Mulberry is quite similar in winter but may be separated by its red-brown buds and yellow-brown bark.

Remarks: Delicious fruits eaten by squirrels and numerous song and game birds, as well as by humans.

and buds with many scales separates it from other species. **Remarks:** Blossoms, not buds, reddish. Flowers sometimes eaten in salads; red roots yield a dye. Wood of commercial value in some areas. Though a member of the pea family, Redbud exceptional in not growing nitrogen-fixing root nodules. Only bobwhite and a few songbirds are known to eat the seeds.

AMERICAN HACKBERRY *Celtis occidentalis* L. **p. 320**
Recognition: A small to large tree with long-pointed, coarse-toothed leaves; bases mostly uneven. Typically, foliage is *rough-hairy* above but is smooth in 2 widespread varieties, *pumila* (Pursh) Gray and *canina* (Raf.) Sarg. Twigs hairless; *pith usually chambered* throughout, or only near the leaf scars. Bud scales hairy; end buds false. Bundle scars 3 (rarely more). Bark basically light gray, rather smooth, but becomes covered with *dark warty knobs* and ridges. Leaves 3″–7″. Height 20′–70′ (100′); diameter 1′–3′ (4′). Flowers greenish, April–May. Fruits spherical, 5/16″–7/16″, 1-seeded, dry, Oct.–Nov., or longer.
Similar species: Other hackberries have leaves toothed only slightly, if at all; bud scales barely hairy; fruits smaller. All 3 species are highly variable and, furthermore, may hybridize. Whether all are valid species even seems in doubt. (1) Sour-gum and (2) Tupelo (Plate 59) have similar winter twigs but have true end buds and fleshy fruits.
Remarks: Wood similar to ash; of commercial value. Fruits ("sugarberries") eaten by numerous birds, including bobwhite, lesser prairie chicken, sharptail grouse, pheasant, and wild turkey.

UPLAND HACKBERRY *Celtis tenuifolia* Nutt. **Not illus.**
Recognition: A smaller upland species. Leaves on fruiting twigs *not toothed* and ½ to ¾ as broad as long. *Not* usually long-pointed; may be sandpapery or not. Fruits 3/16″–5/16″, Sept.–Oct. Height to 25′. Dry situations; Pennsylvania, Indiana, Missouri, and e. Kansas to n. Florida, Louisiana, and Oklahoma.

LOWLAND HACKBERRY *Celtis laevigata* Willd. **Not illus.**
Recognition: Like the last but leaves *narrower,* either toothed or not and often with very long-pointed tips. Leaves *less than ½ as broad as long.* A taller tree of *lowlands* (to 100′). Fruits 3/16″–5/16″, Oct.–Nov. Mostly Coastal Plain bottomlands; se. Virginia to s. Florida, west to Texas, and north in Mississippi Valley to centr. Kentucky, s. Indiana, s. Illinois, s. Kansas, and w. Oklahoma.

NEW JERSEY TEA *Ceanothus americanus* L. **p. 320**
Recognition: A low shrub. Leaves egg-shaped to triangular, *sharp-tipped,* toothed, typically smooth above and somewhat

velvety beneath. One variety (*pitcheri* T. & G.) has blunt-tipped leaves, woolly above and velvety beneath. Twigs and slender buds somewhat hairy; bundle scar single (rarely 3). Sometimes twigs are branched. Leaves 2″–4″. Height to 4′. Flowers white in dense heads, May–Sept. Fruits 3-lobed dry capsules in clusters, *mostly in angles* of leaves, Sept.–Nov., saucerlike capsule bases often present longer.

Similar species: The fruit remnants usually will identify the genus in absence of fan-veined leaves. Redroot has blunt-tipped leaves and flower and fruit heads at ends of branches.

Remarks: One of few nonlegumes to grow nitrogen-fixing nodules on roots. Leaves used for tea during American Revolution. A few birds, including bobwhite and wild turkey, eat fruits.

REDROOT *Ceanothus ovatus* Desf. **Leaf illus. p. 320**

Recognition: Similar to New Jersey Tea but leaves smaller, *blunt-tipped.* Flowers and fruits borne at *tips* of branches. Leaves 1″–2½″. Flowers April–July. Dry soils; w. Maine, w. Quebec, and Manitoba to w. Georgia and Texas.

WILD-LILAC *Ceanothus sanguineus* Pursh **Not illus.**

Recognition: A larger western shrub reported from our area only on Keewenaw Peninsula of northern Michigan. Not a true lilac. Leaves more or less egg-shaped, rounded at tips, wavy-toothed, and sometimes hairy beneath. Flowers and fruits occur on older wood, below twigs and foliage of current year, in contrast to preceding 2 *Ceanothus* species, which bear flowers on the current season's growth. Height to 14′. Flowers white, May–June. Upper Peninsula of Michigan, sw. S. Dakota, and from Montana and s. British Columbia to n. California.

Poplars

(*Plate 44, p. 322*)

The poplars, aspens, and cottonwoods are all members of the same genus. The leaves are mostly toothed and somewhat triangular, with 3–5 main veins meeting near the leaf base. The leafstalks of all poplars are unusually long; the drawings do not show the entire stalks. In some species the leafstalks are flattened and the leaves flutter even in a slight breeze. Poplar buds are unique among plants with 3 bundle scars in that the lowermost bud scale of side buds is always in the outside position directly above the leaf scar. In other plants the lowermost bud scales are lateral. The true end buds may have more scales than the side buds. The bark of most species is distinctively smooth and greenish white when young and dark-furrowed when older. The twigs are often sharply angled. Fruits of poplars are in long, clustered, caterpillarlike catkins, which often release "cottony" seeds. The sexes are separate in poplars. Male plants of White Poplar, Gray Poplar, and Balm-of-Gilead are unknown in our area.

Distributed widely in the Northern Hemisphere, trees of the poplar group may form extensive forests on barren, burned, or cleared areas. Rapid-growing, short-lived species, they are of most value for paper pulp, though some of the soft lumber is used in construction work and in the manufacture of boxes and woodenware. Some kinds are of value as ornamentals and windbreaks. Seeds, buds, and twigs are important foods of numerous birds and mammals, including ruffed, spruce, and sharptail grouse, prairie chicken, whitetail deer, moose, beaver, porcupine, snowshoe hare, cottontail rabbit, and black bear.

WHITE POPLAR *Populus alba* L. **p. 322**

Recognition: European. A tall tree with *white-woolly* leaves, twigs, and buds. Leaves somewhat leathery, with a few large blunt teeth (or shallow lobes). Leafstalks round. Bark smooth and whitish above, often thick and dark at base. Spreads by means of sucker shoots. Leaves 2″–6″. Height 60′–80′ (100′); diameter 2′–3′ (4′).

Similar species: No other tree is as silvery white in all aspects. (1) Gray Poplar has gray-hairy, sharply toothed leaves. (2) Bigtooth Aspen has wide-toothed leaves.

GRAY POPLAR *Populus canescens* (Ait.) Sm. **Not illus.**

Recognition: Similar to White Poplar but leaf undersurfaces and twigs gray-hairy. Leaves never lobed, but rather sharply toothed. A European tree that has spread from cultivation; New England and Minnesota southward.

BIGTOOTH ASPEN *Populus grandidentata* Michx. **p. 322**

Recognition: A small to medium-sized tree with 5–15 pairs of *large* leaf teeth *and flattened* leafstalks. Leaves white-woolly beneath when young. Twigs hairless or slightly gray-silky; buds decidedly gray-hairy. Bark mostly *smooth yellow-green.* Leaves 2″–6″. Height 30′–40′ (80′); diameter 1′–2′.

Similar species: (1) White Poplar has distinctively white-hairy leaves, twigs, and buds. (2) Quaking Aspen is similar in general aspect but has fine-toothed leaves, hairless buds, and often more whitish mature bark.

COMMON COTTONWOOD **pp. 5, 322**
Populus deltoides Marsh.

Recognition: A tall tree with *coarse-toothed* leaves which have 2–3 small but obvious *glands* (use lens) at top of *flattened*

Similar species: Only poplar with end buds gummy yet under ⅝″.

BALSAM POPLAR *Populus balsamifera* L. **p. 322**

Recognition: A northern tree with *fine-toothed* leaves and *rounded* (or occasionally slightly flattened) leafstalks. Leaves usually hairless but may be slightly hairy on veins beneath. Twigs dark brown and hairless. End buds *more than* ⅝″, *gummy, spicy-fragrant* when crushed; 5 bud scales. Side buds have 2 visible scales. Mature bark dark and grooved; gray-green and smooth on younger parts. Leaves 3″–8″. Height 30′–80′ (100′); diameter 1′–3′ (6′).

Similar species: (1) Balm-of-Gilead is more hairy and has 3 exposed scales on the side buds. See (2) Common and (3) Swamp Cottonwoods.

Remarks: Frequently called Balm-of-Gilead (see also next species).

BALM-OF-GILEAD *Populus gileadensis* Rouleau **p. 322**

Recognition: A large sterile tree that may be only a variety of Balsam Poplar, but leaf undersides, leafstalks, and twigs somewhat *hairy*. Side buds have 3 visible scales. Leaves 3″–8″. Height 50′–70′ (80′); diameter 1′–3′ (6′). Reproduces by sprouts.

Oaks (1), (2), (3), and (4)

(Plates 45–48, pp. 324–330)

The oaks are usually tall trees and have great and diversified values. Group identification points are: true end buds clustered at tips of twigs, more than 3 bundle scars per leaf scar, and presence of acorns. Only a very few other plants have clustered end buds (principally Rose-of-Sharon, Plate 42, Corkwood, Plate 59, some cherries, Plate 53, and azaleas, Plate 64) and they lack the other characteristics. Male flowers appear in May and early June as slender drooping clusters of long catkins. Female blossoms are inconspicuous.

The genus *Quercus* is generally divided into 2 sections: the red (or black) oaks and the white oaks. Red oaks differ from the white in that (1) leaf lobes or teeth have hairlike bristle-tips, (2) broken brown acorn shells (not the cups) have hairy inner surfaces, and (3) acorns require 2 years to mature, so both tiny 1st-year and larger 2nd-year acorns usually are present on mature trees in summer. White oaks have leaves that lack bristle-tips and have hairless inner acorn shells and acorns that mature in 1 year. Acorns of red oaks are yellow, bitter, and usually inedible; those of some white oaks are white and relatively sweet and edible. The barks of many red oaks are dark in color; those of white oaks are mostly light. Within the white oak group, however, the Chestnut Oaks are a distinctive subdivision. They have wavy-edged or toothed leaves, mostly inedible acorns, and often dark, frequently deeply ridged barks. Oaks (1), (3), and Live Oak of (4) are white oaks. The others are of the red oak subdivision.

To provide for more simple identification, the oaks are here divided into groups primarily according to whether the leaves are lobed or not. Though variable, most oaks can be identified in season by their leaf shapes alone, as shown on the plates. Exceptions are the Scarlet-Pin Oak group and apparent hybrids between species. Additional foliage data are given beyond for each species. As an aid to winter identification, the drawings, with their natural-size sketches of single end buds, are supplemented (p. 215) by a table. In this table, where a species is listed as having hairy twigs, the degree of hairiness often is slight. A magnifying lens should be used to determine whether twigs or buds are hairy. Buds taken for identification from unknown specimens should be carefully selected for their full, mature growth. Acorns are necessary aids in some identifications. If none are growing, look for old ones on the ground. Acorns always grow partly enclosed in basal growths universally called "cups," but despite this the "cups" are nearly as universally described as "saucerlike," "goblet-shaped," or otherwise treated as uncuplike. Acorns and their cups often provide the most certain means for identifying oak species.

Not every oak specimen can be definitely identified by the amateur. Even professional botanists frequently are puzzled by apparent hybrids and variants. Winter identifications often are especially difficult.

Oaks provide about half the annual production of hardwood lumber in the United States. They are slow-growing, long-lived, and relatively disease- and insect-resistant, although the oak wilt disease currently is causing concern. Bark of several oaks is rich in tannin used in curing leather. By boiling out the tannic acid, the Indians converted into staple articles of diet even the acorns of red oaks. During the Anglo-Saxon rule in England oak forests were valued highly for fattening swine, and laws provided that anyone wantonly injuring or destroying an oak should be fined according to size of tree and its ability to bear fruits.

Extensive browsing on early spring foliage by cattle occasionally results in poisoning. Twigs and fruits of oaks form a large portion of the food consumed by many game birds and mammals. Acorns are eaten by nearly all herbivorous birds and mammals. List of species eating these nuts in our area includes many songbirds as well as the ruffed and sharptail grouse, prairie chicken, bobwhite, wild turkey, pheasant, mourning dove, wood duck,

Brief Guide to Winter Identification of Oaks

Non-evergreen oaks	*Twigs hairless or nearly so*	*End buds under 3/16″*	*End buds narrow, sharp*	*End buds hairy*	*End buds angled*	*Further notes*
Post	no	no	no	yes	no	
Blackjack	no	no	yes	yes	yes	
Scrub	no	yes	no	no	no	
Spanish	no	yes	yes	yes	no	acorn cup saucer-shaped
Sand	no	var.	yes	yes	no	acorn cup goblet-shaped
White	yes	yes	no	no	no	acorn short-stalked, cup bowl-shaped
Swamp	yes	yes	no	no	no	acorn long-stalked, cup bowl-shaped
Overcup	yes	yes	no	no	no	acorn cup unique; see text
Dwarf	yes	yes	no	no	no	shrub
Mossycup	yes	yes	no	yes	no	
Pin	yes	yes	yes	no	no	many stubby pinlike branches
Jack	yes	yes	yes	no	no	northern; acorn cup deep conical
Shumard	yes	yes	yes	no	yes	southern; acorn cup shallow
Willow	yes	yes	yes	no	yes	uplands
Laurel	yes	yes	yes	no	yes	lowlands
Water	yes	yes	yes	yes	yes	buds almost woolly
Shingle	yes	yes	yes	yes	no	bud scales with hairy edges
Scarlet	yes	no	no	yes	no	apex of bud white-hairy
Red	yes	no	yes	no	no	bark dark, usually with flat shiny ridges
Chestnut	yes	no	yes	no	no	bark dark, with sharp dull ridges
Chinquapin	yes	no	yes	no	no	bark light gray; acorn cup scales tight
Basket	yes	no	yes	no	no	bark light gray; acorn cup scales free
Nuttall	yes	no	yes	yes	no	Mississippi valley
Turkey	yes	no	yes	yes	no	southern Coastal Plain
Black	yes	no	yes	yes	yes	bark dark, blocky

whitetail deer, black bear, red fox, gray fox, raccoon, opossum, gray squirrel, fox squirrel, red squirrel, and several chipmunks and ground squirrels. Deer, cottontail, and snowshoe hare browse twigs; porcupine eats the growing layer beneath bark. Many Indians ate acorns; acids of Red Oak acorns were removed by grinding and washing with hot water.

Oaks (1): Leaves Lobed without Bristle-tips

(Plate 45, p. 324)

WHITE OAK *Quercus alba* L. **pp.** *5, 9,* **324**

Recognition: A tall tree with rather *evenly lobed* hairless leaves that may be somewhat whitened beneath. Twigs hairless; end buds red-brown, small, blunt, and hairless. Acorn cup bowl-shaped, covering ⅓ or less of acorn. Bark whitish, slightly furrowed to scaly. Leaves 2″–9″. Height 60′–80′ (150′); diameter 2′–3′ (5′).

Similar species: (1) Overcup and (2) Mossycup Oak leaves usually have deeper divisions. (3) Swamp Oak (Plate 47) leaves may have shallow lobes.

OVERCUP OAK *Quercus lyrata* Walt. **p. 324**

Recognition: A moderate-sized tree of southern bottomlands. Leaves vary (may even resemble White Oak somewhat), but generally with *deep indentation* near base and narrow basal lobes; *fine-hairy* and often whitened beneath. Twigs and end buds as in White Oak except that buds are chestnut-brown. Rough acorn cup is unique, *enclosing nearly all of globular nut;* only very tip visible. Twigs somewhat hairy when very young but soon become hairless. Bark whitish, broken by shallow cracks. Leaves 3″–10″. Height 60′–80′ (100′); diameter 2′–3′ (4′).

Similar species: (1) Mossycup Oak leaves have deep sinuses more centrally located. Acorn cups of both species distinctive. (2) White Oak has shallower leaf sinuses and wider basal lobes.

POST OAK *Quercus stellata* Wang. **p. 324**

Recognition: A small tree with often *leathery* leaves usually lobed so as to resemble a *cross.* Leaves gray or *brown-hairy beneath* except in uncommon hairless shrubby variety *margaretta* (Ashe) Sarg. Twigs somewhat gray-hairy; end buds over 3⁄16″, blunt and rather hairy. Bowl-shaped acorn cups cover ⅓–½ of acorn. Bark brownish, broken by long shallow cracks and often divided into rectangular blocks. Leaves 3″–8″. Height 50′–60′ (100′); diameter 1′–2′ (3′).

Similar species: Blackjack Oak (Plate 46) frequently grows with this species but its leaves lobed and bristle-tipped.

MOSSYCUP OAK (BUR OAK) **pp.** 9, **324**
Quercus macrocarpa Michx.

Recognition: A tall tree with variable leaves usually marked by at least *1 deep pair* of identations which divide leaves *into 2* or more portions. Leaves usually somewhat *hairy and whitish beneath.* Twigs yellow-brown, variably hairless to rather hairy; end buds as in Post Oak. Acorn cups bowl-shaped with peculiar *"mossy" fringe* of elongate scales. Bark light gray, shallowly grooved. Branchlets sometimes have *corky wings* like those of Sweetgum (Plate 42). Leaves 4″–10″. Height 70′–80′ (170′); diameter 2′–3′ (7′).

Similar species: See (1) Overcup and (2) White Oaks.

Oaks (2): Leaves Lobed with Bristle-tips

(*Plate 46, p. 326*)

SCARLET OAK *Quercus coccinea* Muenchh. **p. 326**

Recognition: A medium-sized tree of the red oak group. Leaves *deeply lobed,* either hairless or with tufts of hair in angles of veins beneath. Twigs hairless; end buds scraggly-hairy, over 3⁄16″, and blunt. Acorn cup brownish, hairless or nearly so (use lens); over ¼″ deep, bowl-like, and ⅝″ to ⅞″ in diameter. Bark dark and finely grooved. Leaves 3″–6″. Height 40′–50′ (80′); diameter 1′–2′ (3′).

Similar species: This and next 4 species have similar foliage; best identified by acorn cups. Pin Oak occurs on moister sites.

PIN OAK *Quercus palustris* Muenchh. **pp.** 9, **326**

Recognition: Similar to Scarlet Oak but end buds small, *hairless,* sharp. Twigs hairless. Acorn cup brownish and hairless but *shallow,* saucerlike, and only ⅜″–⅝″ in diameter and less than ¼″ high. Lower branches characteristically point downward; many stubby pinlike branches usually present. Leaves 3″–7″. Height 70′–80′ (110′); diameter 2′–3′ (5′).

Similar species: Jack Oak occurs on uplands and has deeper-tapering acorn cups.

JACK OAK *Quercus ellipsoidalis* E. J. Hill **p. 326**

Recognition: Similar to Pin Oak but growing on uplands. Acorn cup somewhat *conical,* with sides sloping gradually to stalk. Cups finely *gray-hairy;* mostly under ½″ across. Buds red-

southward to n. New England, n. Pennsylvania, n. Michigan, Iowa, and in mountains to N. Carolina. Leaves 4″–10″. Height 70′–80′ (150′); diameter 3′–4′ (5′).

SPANISH OAK *Quercus falcata* Michx. **p. 326**
Recognition: A moderate-sized to tall tree; leaves *variable,* usually with *prominent pair of narrow lobes* toward tip. Var. *triloba* (Michx.) Nutt. lacks lower leaf lobes. Leafstalks over ¾″. Leaf undersides and twigs gray-hairy. End buds small, *hairy,* sharp-pointed but not angled. Acorn cup flat, gray-hairy, saucerlike. Bark dark, somewhat furrowed. Leaves 4″–12″. Height 70′–80′ (100′); diameter 2′–3′ (5′).
Similar species: Three-pronged leaf tips are distinctive. (1) Turkey Oak has more prominent basal leaf lobes. (2) A form of Water Oak has 3-parted leaf tips but they are not so sharp-pointed and are nearly hairless beneath.

TURKEY OAK *Quercus laevis* Walt. **Not illus.**
Recognition: Leaves and twigs of this small southern tree most closely resemble Spanish Oak. Lower lobes of leaves *longer* than upper ones. Leaves often 3-lobed, with central and lower lobes all narrow, resembling turkey tracks in outline. End buds ⅜″–½″, somewhat fine-hairy. Acorn cups ¾″–1″ in diameter, deeply bowl-shaped, gray-hairy. Trunk bark *blue-gray,* furrowed. Sandy Coastal Plain soils; se. Virginia to centr. Florida and se. Louisiana.

BLACKJACK OAK *Quercus marilandica* Muenchh. **p. 326**
Recognition: A low to medium-sized tree. Leaves thick, *leathery, shallow-lobed, brownish-scaly* or hairy beneath. Twigs hairy; end buds large, red-hairy, sharp-pointed, angled. Acorn cup somewhat hairy, shaped like a shallow goblet. Cup scales appear loosely attached. Dark bark broken into *squarish blocks.* Leaves 4″–8″. Height 40′–50′ (70′); diameter 1′–2′ (4′).
Similar species: Post Oak (Plate 45) also has leathery foliage; often grows with Blackjack but leaves more deeply lobed and not bristle-tipped.

SCRUB OAK *Quercus ilicifolia* Wang. **p. 326**
Recognition: A thicket-forming shrub to small tree with *small* leaves *white-woolly* beneath. Twigs hairy; end buds small, blunt, hairless. Acorn less than ⅜″ long and cup is bowl-shaped. Bark dark. Leaves 2″–5″. Height 3′–9′ (18′).
Similar species: Dwarf Oak (Plate 47) also shrubby but leaves toothed rather than lobed.

Oaks (3): Leaves Toothed or Wavy-edged

(*Plate 47, p. 328*)

SWAMP OAK *Quercus bicolor* Willd. **p. 328**

Recognition: A bottomland tree. Leaves mostly have 4–6 pairs of *large rounded teeth* (occasionally sharp-toothed and sometimes forming shallow lobes), *wedge-shaped* at base and usually *white-hairy* beneath. Twigs hairless. Chestnut-brown end buds small, blunt, hairless. Acorn cup bowl-shaped with stalks 1″–2½″, *longer* than leafstalks. Bark *light gray*, ridged or flaky. Leaves 4″–9″. Height 60′–70′ (100′); diameter 2′–3′ (8′).
Similar species: No other oak has acorn stalks much longer than its leafstalks. White Oak leaves much more deeply lobed.
Remarks: Also known as Swamp White Oak. The lumber not distinguished from White Oak.

CHESTNUT OAK *Quercus prinus* L. **p. 328**

Recognition: An upland tree whose leaves have 7–16 pairs of *rounded teeth* (sometimes sharp). Foliage often somewhat leathery; leaves may be slightly hairy beneath. Twigs hairless. End buds narrow, sharp, and mostly over 3⁄16″. Acorn cup bowl-shaped, less than 1″ across, with tight scales free only at the tips. Trunk bark *dark, deeply ridged*, quite distinctive. Leaves 4″–9″. Height 60′–70′ (100′); diameter 3′–4′ (7′).
Similar species: (1) Basket Oak has light-colored bark, more scaly and larger acorns. (2) Chinquapin Oak has sharp leaf teeth. (3) Chestnut (Plate 57) lacks clustered end buds.

BASKET OAK **Leaf edge illus., p. 328**
Quercus michauxii Nutt.

Recognition: Leaves similar in outline to Chestnut Oak but typically more deeply and sometimes more sharply toothed; often white-hairy beneath. Trunk bark *light gray*, rough, and flaky like Chinquapin. Acorn cup similar to that of Chestnut Oak but 1″–1¼″ in diameter, bowl-shaped, with scales attached *only at base*. Leaves 4″–8″. Height to 100′; diameter to 4′. Coastal Plain bottomlands; New Jersey to centr. Florida, west to e. Texas, north in Mississippi Valley to e. Kentucky, sw. Ohio, centr. Illinois, and se. Missouri.

CHINQUAPIN OAK **p. 328**
Quercus muehlenbergii Engelm.

Recognition: A medium-sized tree whose leaves have 8–13 pairs of *sharp teeth*. Twigs, buds, and acorn cups resemble those of Chestnut Oak but bark *light gray* and often flaky, not ridged. Leaves 4″–9″. Height 20′–50′ (160′); diameter 6″–24″ (4′).
Similar species: (1) Dwarf Oak also has sharp-toothed leaves

but teeth are fewer and leaves smaller. (2) Live and (3) Darlington Oaks (Plate 48) may have some leaves with sharp teeth but foliage is leathery and evergreen.

DWARF OAK *Quercus prinoides* Willd. **p. 328**
Recognition: A shrubby oak. Leaves *small, sharply toothed,* 3–7 pairs of teeth, white-hairy beneath. Twigs and buds resemble Swamp Oak but smaller. Acorn cup ⅜″–⅞″ across, with tight scales. Var. *rufescens* Rehd. of several Atlantic coastal places has reddish-hairy twigs and leaf undersides. Leaves 2″–5″. Height 2′–10′ (18′); diameter 1″–4″ (10″).
Similar species: See (1) Chinquapin Oak; also (2) Scrub Oak (Plate 46).
Remarks: The name Dwarf Chinquapin Oak also used.

Oaks (4): Leaves Not Lobed, Toothed, or Wavy-edged

(Plate 48, p. 330)

SHINGLE OAK *Quercus imbricaria* Michx. **p. 330**
Recognition: A tree whose leaves *lack* either teeth or lobes but whose single bristle-tips indicate it to be one of red oak group. Foliage densely *hairy beneath.* Twigs hairless; end buds more or less *silky* and angular; bud-scale edges hairy. Acorn cup bowl-shaped, covering ⅓–½ of acorn and 9⁄16″–13⁄16″ across. Bark dark, irregularly grooved. Leaves 3″–7″. Height 50′–60′ (100′); diameter 2′–3′ (4′).
Similar species: Four other oaks have thin, nonleathery leaves neither toothed nor lobed. All are red oaks. (1) Laurel Oak has narrower hairless leaves, deeply saucer-shaped acorn cups, gray bark. (2) Willow Oak has still narrower leaves, hairless or, less commonly, silky beneath; acorn cups shallowly saucer-like; and the bark is dark. (3) Water Oak has unique wedge-shaped foliage. (4) Sand Oak has somewhat leathery leaves, white-woolly beneath.

LAUREL OAK *Quercus laurifolia* Michx. **Not illus.**
Recognition: A large nonevergreen tree whose *nonleathery* leaves are intermediate in shape between Shingle and Willow Oaks. *Hairless* except for tufts in angles of veins beneath. Twigs hairless or slightly hairy. End buds angled, sharp, hairless, often over ⅛″. Acorn cups vary from deep saucer shape to bowl shape, ⅝″–⅞″ across. Cup scales have free tips. Bark *gray,* scaly. Darlington Oak has similar but leathery leaves. Coastal Plain swamps; s. New Jersey to centr. Florida, west to e. Texas.

WILLOW OAK *Quercus phellos* L. **p. 330**

Recognition: A tall tree with *narrow, bristle-tipped* leaves that are hairless or, in form *intonsa* Fern., white-silky beneath. Twigs hairless; end buds narrow, sharp, hairless, mostly under ⅛″. Acorn cups *very shallow* and saucerlike, ⅜″–½″ across. Bark dark and shallowly grooved. Leaves 2″–5″. Height 70′–80′ (100′); diameter 2′–3′ (4′).

Similar species: (1) Shingle Oak has wider leaves and deeper acorn cups; (2) Sand Oak has leaf undersides and twigs woolly.

SAND OAK *Quercus incana* Bartr. **Not illus.**

Recognition: A small tree with somewhat *leathery but not evergreen* leaves shaped like those of Willow Oak but occasionally wavy-edged. Foliage with *fine, whitish woolliness* beneath. Twigs densely woolly to nearly hairless; buds variable in length. Acorn cup goblet-shaped, ⅜″–⅝″ across. Bark black or gray, dividing into squarish blocks. Shingle Oak is less hairy and has smaller acorns. Coastal Plain soils; se. Virginia to s. Florida, west to centr. Texas and se. Oklahoma.

WATER OAK *Quercus nigra* L. **p. 330**

Recognition: A southern tree with wedge-shaped hairless leaves *broadest near tip.* Leaves may be bristle-tipped. Tips deeply 3-parted in uncommon form *tridentifera* (Sarg.) Trel. Twigs hairless but narrow end buds quite hairy. Acorn cup flat, saucer-shaped, ⅜″–⅝″ across. Bark dark and rather smooth. Leaves 2″–5″. Height 50′–60′ (80′); diameter 2′–3′ (4′).

Similar species: (1) See Shingle Oak (p. 221). (2) If leaves are deeply 3-parted at tips, see Spanish Oak (Plate 46).

LIVE OAK *Quercus virginiana* Mill. **p. 330**

Recognition: A spreading southern evergreen tree or shrub of the white oak group, with *leathery* leaves. Leaves usually have *rolled edges;* mostly gray or white-hairy beneath. Some may be sharply toothed in part. Leaves *not* bristle-tipped. Twigs gray-hairy; end buds small, hairless, blunt. Acorn cup is cup-shaped. Bark dark, somewhat broken into squares. Trees often draped with Spanish "moss." Shrubby variety *maritima* (Chapm.) Sarg. occurs on sand dunes. Leaves 1″–4″. Height to 60′; diameter to 8′.

Similar species: Only this and next species have thick, leathery, evergreen unlobed leaves. Darlington Oak has saucer-shaped acorn cups and characteristics of red oak group. Rare toothed Live Oak leaves are nevertheless distinctively leathery.

DARLINGTON OAK **Not illus.**
Quercus hemisphaerica Bartr.

Recognition: A somewhat evergreen tree with narrow unlobed leathery leaves whose edges may be rolled. They are widest near tips and many have wavy or even toothed edges. Leaf tips bear bristles characteristic of red oak group. Some strong shoots may bear toothed leaves but leathery leaves are unlike Chinquapin (Plate 47) or similar oaks. Acorn cups saucerlike; scales have free tips. Some consider this plant to be only a variant of Laurel Oak. Coastal Plain; se. Virginia and Florida to e. Texas.

Magnolias

(*Plate 49, p. 332*)

The magnolias are distinctively marked plants of tropical appearance and southern relationships. The ranges of a number extend into the northern states, especially in the Appalachians. The leaves are smooth-edged and often large; the twigs are ringed by stipule scars; the buds are covered by a single scale; the true end buds usually are especially large; and the bundle scars are many. All magnolias are frequently cultivated for their large leaves and showy white flowers. Their large brownish conelike fruit clusters are frequently ornamental when ripe. They release bright red seeds on silklike threads from many slitlike openings.

Only the magnolias, Tulip-tree, and Sycamore have more than 3 bundle scars per leaf scar and ringed twigs. Sycamore (Plate 42) has peculiar mottled bark and buds surrounded by leaf scar; Tulip-tree (Plate 42) has notched leaves, buds spicy when crushed, and chambered pith; it is a member of the magnolia family. Beech (Plate 57) has ringed twigs but the leaves are toothed and the bundle scars only 3. Tall Pawpaw (Plate 59) has similar foliage but lacks stipular rings and has only 3 bundle scars.

SWEETBAY MAGNOLIA *Magnolia virginiana* L. **p. 332**
Recognition: A large shrub or small tree with thick, rather *leathery*, elliptic leaves that are evergreen, especially in South. Foliage *spicy* when crushed; *white beneath.* Leaves hairless except in var. *australis* Sarg. (north only to Arkansas and se. Virginia). Buds hairy and green but twigs generally hairless. Pith *chambered.* Leaves 4″–7″. Height to 50′ (rarely 70′); diameter to 2′ (rarely 3′). Flowers white, large, fragrant, May–July. Fruits 1″–2″, Sept.–Oct.
Similar species: No other wild magnolia in our area has both thick leathery leaves and chambered pith.

CUCUMBER MAGNOLIA *Magnolia acuminata* L. **p. 332**
Recognition: A hardy magnolia of tree size with large, thin, egg-shaped leaves *green* and slightly hairy beneath. Twigs

AMERICAN ELM *Ulmus americana* L. **pp.** *6, 9,* **334**

Recognition: When growing in the open as a large tree, trunk divides near the ground into large limbs, giving a *unique vase-shaped form.* Leaves variable, smooth or sandpapery above, hairless or hairy beneath. Twigs hairless or barely hairy; branchlets without corky "wings." Buds over ¼″, with light brown but dark-edged scales. Leaves 2″–6″. Height 80′–100′ (125′); diameter 2′–5′ (10′). Flowers March–May. Fruits about ⅜″ broad, hairless except for hairy margin, long-stemmed, April–May.

Similar species: Other elms have distinctive buds, but Rock Elm without corky wings may be confusing (see preceding species).

Remarks: Seeds eaten by bobwhite, "Hungarian" partridge, ruffed grouse, prairie chicken, gray and fox squirrels, and opossum. Cottontail rabbit, snowshoe hare, and whitetail deer browse twigs. Like the Chestnut (p. 264) in an earlier generation, this beloved species is rapidly being decimated by disease. Stands of dead trees occupy lowland sites in many places. Full-sized trees are becoming scarce. "Dutch" elm disease is a fungus spread by a beetle.

ENGLISH ELM *Ulmus procera* Salisb. **p. 334**

Recognition: An introduced tree, usually with several large branches mostly at right angles to upright trunk. Leaves moderate-sized, slightly sandpapery above, nearly hairless beneath. Branchlets *often corky-winged;* buds a uniform dark color. Leaves 1½″–3″. Height 80′–100′ (125′); diameter 2′–3′ (5′). Flowers April. Fruits ⅜″–½″ broad, base narrow, entirely hairless, short-stemmed, April–May.

Similar species: Dark buds rather distinctive, but see Witch Elm.

WITCH ELM *Ulmus glabra* Huds. **Not illus.**

Recognition: Similar to the English Elm but twigs *hairy* and leaves sandpapery above and hairy beneath. Sometimes spreads from plantings.

SLIPPERY ELM *Ulmus rubra* Muhl. **p. 334**

Recognition: A medium-sized tree with single or divided trunk. Leaves very rough and sandpapery above and hairy beneath. Twigs *rough-hairy;* buds prominently *red-hairy* and over ⅛″. Leaves 5″–9″. Height 40′–60′ (70′); diameter 1′–2′ (3′). Flowers March–May. Fruits ⅜″–⅞″ broad, hairless except for centers of each side, short-stemmed, May–June.

Similar species: No other elm has rough-hairy twigs and red-hairy buds.

Remarks: Common name of this rough-textured tree comes from the slimy inner bark, once well known as a scurvy preventive. It was ground into flour or chewed piecemeal. Cottontail rabbits and deer eat twigs. Porcupines may eat the growing layer beneath bark.

SIBERIAN ELM *Ulmus pumila* L. **Not illus.**
Recognition: A shrub or small tree introduced from Asia, and established at least from Minnesota to Kansas. The 1″–3″ leaves mostly are narrow and only *singly toothed.* Twigs and buds nearly hairless; buds small and *blunt.* Fruits hairless, ⅜″–⅝″ broad and shorter than broad. Water-elm occurs eastward.

WATER-ELM *Planera aquatica* (Walt.) J. F. Gmel. **p. 334**
Recognition: A small southern tree with egg-shaped, *single-toothed,* nearly hairless leaves. Twigs and buds *hairless,* the latter mostly less than ⅛″ but *pointed.* Trunk bark more scaly than in true elms. Leaves 2″–3″. Height 30′–40′; diameter 18″–20″. Flowers April. Fruits wingless nuts covered with irregular protuberances, April–May.
Similar species: Only this and Siberian Elm have single-toothed leaves. Ranges, fruit and bud shapes, however, are dissimilar.
Remarks: Fruits eaten by mallard, black, and ringneck ducks and squirrels.

Ironwood, Hornbeam, Hazelnuts, and Alders

(*Plate 51, p. 336*)

These species and the birches (Plate 52) make up a family related to the willows, poplars, oaks, and other plants whose flowers occur in catkins. Catkins are usually dangling strands of small flowers but may be short and inconspicuous.

Elms and birches and plants of this plate mostly have double-toothed leaves (see Speckled Alder) and 3 bundle scars per leaf scar (see hazelnuts). Elms have leaves uneven-based, end buds false, and bud scales in 2 rows. Birches have leaves even-based, true end buds, and only 2–3 bud scales per bud. Those plants on Plates 50 and 51 which have false end buds also have leaves (and buds and leaf scars) arranged in 2 opposing rows along twigs.

IRONWOOD *Carpinus caroliniana* Walt. **p. 336**
Recognition: A small tree with distinctive *muscular-appearing, smooth, dark gray* bark. Trunk has a deeply rippled and sinewy look. Leaves egg-shaped, double-toothed, and in North sometimes long-pointed. Twigs variably hairy or not. Buds brown, *somewhat square* in cross section, with scales in 4 rows; end buds false. Leaves 1″–5″. Height 20′–40′; diameter 10″–24″. Flowers April, male catkins not present in winter. Fruits tiny nuts attached to 3-pointed leafy bracts, Aug.–Oct.
Similar species: Trunk and bark are unique. Angled buds help separate small specimens from those of Hornbeam.

Remarks: Nearly all botany books published during the past generation name this plant Blue Beech and the next one Ironwood. However, *Carpinus* (which is not in the same family as the true Beech) is still commonly called Ironwood in many areas because of the strong muscular appearance of trunk. Conversely, *Ostrya* appears no stronger than most small trees. This results in a confusion of 2 "ironwoods" and is further complicated by the alternate names of American Hornbeam and Hop Hornbeam applied to these 2 species respectively.

Wood of this tree is heavy and tough but, surprisingly, decays rapidly upon contact with the ground. Charcoal made from Ironwood reportedly once used in manufacture of gunpowder. Fruits eaten by many birds, including ruffed grouse, bobwhite, pheasant, and wild turkey and by gray squirrels. Cottontail rabbit and whitetail deer nip the shoots.

HORNBEAM *Ostrya virginiana* (Mill.) K. Koch **p. 336**

Recognition: A small tree with foliage and twigs much as in Ironwood but bark brownish, grooved, and shreddy. Buds *round* in cross section and pointed; end buds false. Bud scales finely grooved (use lens) and not arranged in rows. Leaves 1″–5″. Height 20′–30′ (40′); diameter 6″–12″ (24″). Flowers April–May, male catkins usually present in winter. Fruits small bladder-enclosed nuts, Aug.–Oct.

Similar species: (1) Ironwood has squarish buds and (2) American Hazelnut has blunt buds.

Remarks: Related European trees were originally used in yoking oxen and were known as Yoke-elms or Hornbeams. Seeds eaten by ruffed and sharptail grouse, bobwhite, pheasant, and ptarmigan. Deer and cottontail rabbit browse twigs.

AMERICAN HAZELNUT *Corylus americana* Walt. **p. 336**

Recognition: A shrub with broad, somewhat *heart-shaped, double-toothed* leaves. Twigs and leafstalks with *stiff hairs.* Buds blunt, with several evident bud scales; end buds false. Bundle scars 3 or sometimes more. Leaves 2″–5″. Height to 10′. Flowers April–May. Fruit edible nuts enclosed in thin flattened hairy *ragged-edged* husks, July–Sept.

Similar species: (1) Beaked Hazelnut has nearly hairless twigs, fewer bud scales, beaked fruits. (2) Hornbeam has pointed buds, narrower leaves.

Remarks: Anyone who has tried to collect these nuts (also called filberts) in late summer has found that he is not alone in appreciation of them. Squirrels, chipmunks, jays, deer, grouse, quail, and pheasant usually get there first.

BEAKED HAZELNUT **Fruit illus., p. 336**
Corylus cornuta Marsh.

Recognition: Similar to American Hazelnut but twigs usually *hairless.* Buds less blunt, with several scales, lowermost scales large and paired. Edible nuts enclosed in bristly husks, which are *prolonged to form a beak,* Aug.–Sept. Thickets and woods borders; Newfoundland and British Columbia to Georgia, e. Kansas, and Colorado.

EUROPEAN BLACK ALDER **p. 336**
Alnus glutinosa (L.) Gaertn.

Recognition: An upright tree with *wide, blunt-tipped,* usually double-toothed leaves. Twigs and young leaves *gummy.* Buds, as in most alders, smooth, few-scaled, reddish, narrow-based. Bundle scars 3. Bark of stout trunk *dark,* with numerous short warty stripes. Leaves 2″–5″. Height 20′–50′ (70′); diameter 1′–2′. Flowers March–May. Fruits small *pine-cone-like catkins* on long slender stalks, usually present.

Similar species: Alders are unique in having stalked buds covered by 2–3 (3–4 in Mountain Alder) smooth, usually reddish scales and in having peculiar small "cones." This and (1) Seaside Alder only alders that regularly grow as trees. This species larger, leaves are blunt, cones long-stalked. Flowers appear in spring and the range is more northern. (2) See European White Alder. (3) Common Winterberry Holly (Plate 61) often called Black Alder.

EUROPEAN WHITE ALDER **Not illus.**
Alnus incana (L.) Moench

Recognition: Similar to European Black Alder but leaves pointed, hairy beneath. Bark whitish gray; cones short-stalked. Rarely escapes from cultivation.

SEASIDE ALDER **Twig illus., p. 336**
Alnus maritima (Marsh.) Nutt.

Recognition: A shrub or tree of restricted coastal distribution. Leaves egg-shaped to elliptic, with bases either narrow or broad, upper surfaces *glossy.* Bud scales narrow and distinct. Stem bark smooth. Leaves 2″–5″. Height to 30′; diameter to 6″. Flowers in *late summer,* Aug.–Sept. Fruits require 2 years to mature. See other alders. Pond and streambanks; coastal districts of Maryland and Delaware, also reported from the Red River, Oklahoma.

SMOOTH ALDER *Alnus serrulata* (Ait.) Willd. **p. 336**

Recognition: A shrub or, rarely, small tree forming thickets along watercourses. Leaves variably hairless or velvety beneath, bases wedge-shaped or only slightly rounded. Leaf edges double-toothed or not and wavy. A round-leaved variety sometimes found east of Appalachians; some forms of this variety have notched or rounded leaf tips. Dark stem bark *lacks*

Birches

(*Plate 52, p. 338*)

Birches are trees and shrubs of northern distribution. The leaves are mostly double-toothed and more or less egg-shaped or triangular, with blunt bases. Bark of most species is marked by numerous cross streaks and tends to separate into papery sheets. Buds are 2- to 3-scaled and bundle scars are 3. Short spur branches of densely clustered leaves and leaf scars may be present.

Native birches that possess dark bark might be confused with some cherries (Plate 53). Birches differ in that (1) bud scales are fewer, (2) leafstalks do not have glands, (3) broken twigs may have a strong wintergreen odor, rather than sour smell of cherry twigs, (4) bark of many species can be separated into papery sheets, and (5) leaves are double-toothed and usually do not taper at base. The flowers of birches are in catkins; these become long clusters of small dry fruits.

Birch lumber is of value in cabinetmaking and interior finishing. It is also used in the manufacture of agricultural implements, spools, clothespins, etc. The bark of some species once was used in making canoes. In several birches the curling older bark is highly flammable; even when damp it provides excellent tinder. The fermented sap of several birches has been used in beverages. Seeds and buds are eaten by numerous song and game birds. Several mammals consume the twigs and bark.

AMERICAN WHITE BIRCH **p. 338**
Betula papyrifera Marsh.

Recognition: White birches grow from small brownish-barked saplings to be white-trunked small to medium-sized trees. This, and less common similar species (see below), are our only trees with *clear white peeling bark* marked by narrow *horizontal stripes*. Varieties occurring locally: with brown bark in maturity, *commutata* (Regel) Fern.; with drooping twigs, *pensilis* Fern.; and with heart-shaped leaves, *cordifolia* (Regel) Fern. Leaf blades 1″–4″. Height 70′–80′ (120′); diameter 1″–2″ (4″). Flowers spring. Fruits Aug.–Sept.

Similar species: (1) See Gray Birch. (2–4) 3 other species of birches have white peeling bark. Although this one will be most frequently encountered, it may be separated from the others as follows:

1. Twigs and leaf undersides (at least at angles of the veins) hairy:
    2. Buds not covered with resin **AMERICAN WHITE BIRCH**
    2. Buds shiny with a sticky resin **EUROPEAN WHITE BIRCH**

1. Twigs and leaves not hairy:
   3. Twigs long, drooping, not gummy; leaf bases not toothed **EUROPEAN WEEPING BIRCH**
   3. Twigs not "weeping," often gummy; leaf bases toothed **BLUELEAF BIRCH**

Remarks: The various layers of bark have been used for canoe and wigwam coverings (tied in place with spruce rootlets), boxes, cups, makeshift shoes, and emergency snow goggles. Leaves have been used for tea, but are not as good as those of Black and Yellow Birches. White Birch lumber used for woodenware, pulp, and fuel. Seeds and buds eaten by ruffed and sharptail grouse. Twigs are cropped by moose, deer, and snowshoe hare.

EUROPEAN WHITE BIRCH *Betula alba* L. **Not illus.**

Recognition: This Old World tree has spread from Newfoundland and New England to Michigan. Twigs densely hairy and leaf blades shorter (1″–2″), not so long-tipped as in native white birch. Buds shiny with a gummy substance.

EUROPEAN WEEPING BIRCH **Not illus.**
Betula pendula Roth

Recognition: This second European birch with white bark occurs only occasionally from Nova Scotia and Wisconsin to New England and Iowa. Mature trees are small, with long, drooping, hairless twigs. Leaf blades 1″–3″, with bases not toothed.

BLUELEAF BIRCH **Not illus.**
Betula caerulea-grandis Blanch.

Recognition: A large tree. Twigs hairless and sometimes gummy. Leaf blades somewhat bluish, long-pointed, 2″–4″; bases toothed except near leafstalk. Bark white. Occurs from Nova Scotia and n. Quebec to n. New England and e. New York.

GRAY BIRCH *Betula populifolia* Marsh. **pp.** *10,* **338**

Recognition: A 1- to many-stemmed small tree with *chalky-white* bark and *triangular long-pointed* leaves. Trunks are marked by many *dark chevrons* at bases of branches as well as by narrow horizontal marks characteristic of all birches (and most cherries). Bark does not readily separate into layers. Leaves 1″–4″. Height 20′–30′ (40′); diameter 10″–18″. Flowers April–May. Fruits Sept.

Similar species: Preceding 4 white-barked birches may have some inverted V-shaped marks, but they are neither so strong nor so numerous as in this species. Long-pointed leaves, hairless rough-warty twigs, and chalky-white (not creamy) nonpeeling bark distinctive.

Remarks: Oil of wintergreen occurs in sap and leaves. Wood important in commerce; often stained for cherry or mahogany finishes. Wildlife utilizing the plant for food includes ruffed and sharptail grouse, prairie chicken, whitetail deer, moose, cottontail rabbit, and red squirrel.

RIVER BIRCH *Betula nigra* L. **p. 338**

Recognition: A *shaggy-barked* tree of streambanks; most southern of our birches. Bark varies from smooth red-brown on youngest branches to rough near-black plates on trunk. Undersides of leaves whitish and sometimes velvety. Leafstalks and buds hairy. Leaves 1″–5″. Height 60′–80′ (90′); diameter 2′–3′ (5′). Flowers April–May. Fruits June–Sept.

Similar species: (1) Only other streamside tree birches have white bark. (2) Swamp Birch is shrubby, with single-toothed leaves.

Remarks: Ruffed grouse and wild turkey sometimes eat the seeds.

SWAMP BIRCH *Betula pumila* L. **p. 338**

Recognition: A low but upright bog-inhabiting birch. Only *shrubby* birch occurring in much of our U.S. area. Typical specimens have soft-hairy twigs and egg-shaped single-toothed leaves *pale green to white beneath.* Hairless variety *glabra* Regel occurs in Michigan and n. Indiana. The low, spreading, hairy variety *renifolia* Fern., with darker kidney-shaped leaves, occurs in Canadian Maritime Provinces. Var. *glandulifera* Regel is more or less hairless, with somewhat warty twigs and lower leaf surfaces. Leaves ½″–4″. Height to 9′. Flowers May–June. Fruits Aug.–Sept.

Similar species: Following 4 are also shrubby but only next 2 may have hairy twigs. (1) Northern Birch has double-toothed leaves; (2) Newfoundland Dwarf Birch may be differentiated by leathery leaves. (3) See Yellow Birch hybrids.

NORTHERN BIRCH *Betula borealis* Spach **Not illus.**

Recognition: Growing variously as a flattened shrub, erect shrub, or small tree, this species has densely *white-hairy* twigs, and double-toothed leaves ½″–3″ long and not conspicuously lightened beneath. See Swamp Birch. Poor soils; Newfoundland, Labrador, and Ungava to Nova Scotia, centr. Maine, and n. Vermont.

NEWFOUNDLAND DWARF BIRCH **Not illus.**
Betula michauxii Spach

Recognition: A very small shrub that creeps by means of underground stems much like dwarf willows (Plate 32). The 4″ to 24″ branches are erect, however, and have brownish-woolly twigs. Leaves hairless, leathery, only ¼″–½″ long and about as broad. See Swamp Birch. Acid soils; se. Labrador, n. Quebec, and Newfoundland.

TUNDRA DWARF BIRCH **Twig illus., p. 338**
Betula glandulosa Michx.

Recognition: A matted to erect shrub. Twigs hairless, or very nearly so, roughened with resinous *wartlike dots.* Leaves *leathery,* egg-shaped to nearly circular. Leaves ¼″–1½″. Height to 7′. Flowers June–July. Fruits Aug.–Sept. The following is the only other shrubby birch with hairless warty twigs. Its leaves are not leathery. Mostly tundra and alpine areas; Newfoundland, centr. Maine, mountains of New Hampshire, n. New York, n. Ontario, and sw. S. Dakota northward.

Remarks: Ptarmigan, sharptail grouse, and prairie chicken have been recorded as eating seeds, buds, or foliage.

MINOR BIRCH *Betula minor* (Tuckerm.) Fern. **Not illus.**

Recognition: Shrubby, with hairless warty twigs and growth habits varying from low and sprawling to erect and 6′ tall. Leaves ½″–2″, not leathery. See Tundra Dwarf Birch. Arctic and alpine areas; from Newfoundland and mountains of New England, New York, and Quebec northward.

Cherries and Thornless Plums

(*Plate 53, p. 340*)

The cherries, plums, and peach are all members of the genus *Prunus,* in the rose family. Only some of the first 2 groups are native to the United States. Those discussed here are upright thornless species. The low Sand Cherry is on Plate 32 and the thorny plums are on Plate 38. The cherries, plums, and peach are alike in having: bark marked with numerous cross streaks, leafstalks usually bearing glands, leaves single-toothed, narrow-based (except Mahaleb Cherry) and frequently with long-pointed tips, twigs when broken possessing a peculiar odor, and buds with more than 3 scales. Short spur branches (drawing, p. 310) may be present. The "almond" scent of the broken twigs is difficult to describe but is a reliable aid to the identification of the genus. Though many plums bear thorns (see Plate 38), several species do not. Fruits of plums are covered with whitish powder; they are encircled about the long axis by a line, and the stones mostly are somewhat flattened. Cherries are always thornless, their fruits lack powdery bloom and encircling lines, and the seeds are nearly spherical. Plums and peach also differ from cherries in that the twigs lack true end buds.

Despite the edible fruits of most cherries, the leaves, twigs, and seeds frequently contain hydrocyanic acid, believed to lend the

Grayish bark, at least of older trunks, much cracked and broken, sometimes scaly. Leaves egg-shaped, often double-toothed, with *6–8 pairs* of veins that are hairless beneath. Buds stout and dark brown. Flowers or fruits may be clustered on *leafy spur branches*. Leaves 2″–5″. Height 20′–30′; diameter 10″–12″. Flowers May–June. Fruits red, sour, June–July.
Similar species: See Sweet Cherry.
Remarks: Believed to have originated in western Asia. Many cultivated varieties, principally those with tart flavor, are derived from this stock.

MAHALEB CHERRY **Twig illus., p. 340**
Prunus mahaleb L.
Recognition: Similar to Sour Cherry but with *hairy* twigs and small but wide, *almost circular, hairless* leaves, which may be heart-shaped at base. Leaves 1″–3″. Height 20′–25′; diameter 8″–10″. Flowers April–May. Fruits July. Only cherry with velvety twigs. Beach Plum has such twigs but the end buds are false. Established locally; New England and s. Ontario southward.
Remarks: The Mahaleb, or Perfumed, Cherry was imported from Europe and the Caucasus for grafting stock. The fruits are inedible but yield a violet dye. Oil from seeds is used to fix perfumes. Aromatic wood is fashioned into pipes and walking sticks.

BEACH PLUM *Prunus maritima* Marsh. **p. 340**
Recognition: *Velvety* twigs and *hairy* buds mark this coastal, straggling, shrubby plum. Leaves egg-shaped, *hairy* beneath. Leaves 2″–3″. Height to 8′. Flowers white, April–June. Fruit purplish, Sept.–Oct.
Similar species: (1) Graves Plum has more circular leaves. (2) Alleghany Plum (p. 240) has long-pointed leaves and less bushy growth form.
Remarks: Edible fruits used in sauces, preserves, jellies, and pies.

GRAVES PLUM *Prunus gravesii* Small **Not illus.**
Recognition: Similar to Beach Plum but with somewhat wider, nearly circular leaves, lower growth, and more restricted range. Height to 4′. Flowers white, May. Fruits blackish, Sept. Sandy areas; Long Island and se. Connecticut.

GOOSE PLUM *Prunus hortulana* Bailey **p. 340**
Recognition: A shrub or small tree with narrow to egg-shaped and usually *flat* leaves that are hairless or nearly so. Stones of fruit *pointed at both ends*. Leaves 3″–6″. Height 10′–20′ (30′);

diameter 4″–10″ (12″). Flowers March–May. Fruits yellow or red, Aug.–Oct.

Similar species: Munson Plum has leaves that are not flat but tend to fold lengthwise; stones not pointed at both ends.

Remarks: Grown by horticulturists, this native species has given rise to numerous orchard varieties.

MUNSON PLUM **Not illus.**

Prunus munsoniana Wight & Hedrick

Recognition: A close relative of the Goose Plum. Has longer, quite narrow leaves, which tend to fold lengthwise. Teeth on leaves may bear tiny reddish glands. Stones of fruits pointed *at one end.* It too is parent of horticultural varieties. Thickets; s. Ohio, Missouri, and se. Kansas to Georgia, n. Mississippi, and centr. Texas.

ALLEGHANY PLUM **Not illus.**

Prunus alleghaniensis Porter

Recognition: An eastern shrub or small tree with *hairy* twigs and narrow to egg-shaped finely-toothed and gradually long-pointed leaves that may be somewhat hairy beneath. Occasionally twig tips are spiny. Leaves 2″–5″. Height to 17′; diameter to 8″. Flowers April–May. Fruits purple, about 7/16″ in diameter, stone less flattened than in other plums, Aug.–Sept. See Beach Plum (p. 239). Thickets; Connecticut and w. Pennsylvania to nw. N. Carolina and ne. Tennessee. Reported also from Michigan.

Juneberries

(*Plate 54, p. 342*)

The juneberries are shrubs or small trees with the leaves toothed and often blunt-tipped. The buds are different from those of other plants in being pink to reddish, slender, with scales that are dark-tipped and usually somewhat twisted. Bundle scars are 3 per leaf scar. The trunk bark is usually tight and rather dark, with low vertical twisting ridges. A number of the lower clumped species spread by horizontal stems on or just beneath the ground surface.

Known variously as serviceberries, shadbushes, shadblows, and sarvis, the amelanchiers make up one of the "difficult" groups within the rose family. Whether there are few or many species depends upon the botanist consulted. The species are quite variable and some apparently hybridize. Marks of identification in winter have not been determined for all juneberries. The better-known species are illustrated.

Because a number of the juneberries are not illustrated, a preliminary tabulation is presented here. Reference to the drawings and to these lists and then to the text may simplify identification of unknown juneberries. Those marked * have limited distribution in our area.

Fine-toothed juneberries (14–30 teeth per inch):

Long-pointed leaves	*Short-pointed leaves*	*Blunt-tipped leaves*
Downy	Inland*	Running
Smooth	Swamp	Coastal
	Bartram	Nantucket*
		Nova Scotia*
		Fernald*
		Oblongleaf

Coarse-toothed juneberries (6–12 teeth per inch):

Short-pointed leaves	*Blunt-tipped leaves*
Wiegand	Low
Minnesota*	Alderleaf*
	Gaspé
	Roundleaf
	Large-flowered*
	Huron

Though the group is composed mostly of shrubs, small-tree juneberries often are prominent in the forest understory. In the early spring, before the leaves develop, the drooping white flower clusters are quite attractive. In the eastern states, near tidal rivers, the name shadbush is a result of the flowers appearing when the shad ascend coastal streams to spawn.

The small applelike fruits of the juneberries are esteemed by humans. Heavy crops are rare because numerous birds and mammals are quick to take advantage of whatever fruits mature. When available, they are delicious in jams, jellies, and pies. They are eaten by many songbirds, wild turkey, ruffed and sharptail grouse, bobwhite, mourning dove, striped skunk, red fox, raccoon, black bear, red and gray squirrels, and chipmunks. Cottontail rabbit, beaver, whitetail deer, and moose browse the twigs.

Juneberry Holly (p. 275) has only 1 bundle scar per leaf scar.

DOWNY JUNEBERRY **p. 342**

Amelanchier arborea (Michx. f.) Fern.

Recognition: One of the taller juneberries, often growing to tree height. Leaves fine-toothed, usually *heart-shaped at base,* somewhat *long-pointed,* white-hairy beneath, at least along veins and leafstalk. Leaves 3″–5″. Height 20′–40′ (50′); diameter

circular fine-toothed leaves *not toothed* on the *lower* portions. Expanding leaves may be white-woolly but this down soon disappears. Spreads by underground runners. Leaves 1″–3″. Height to 5′. Flowers May–June. Fruits blackish, July–Aug. **Similar species:** Next 4 species are low, fine-toothed, and grow in patches like this one, but their leaves are toothed to the base and either somewhat oblong in shape or leathery in texture.

COASTAL JUNEBERRY **Not illus.**

Amelanchier obovalis (Michx.) Ashe

Recognition: Like Running Juneberry but southern. Leaves *oblong-shaped, dull-surfaced,* toothed nearly to base. They remain somewhat hairy after losing their original white-woolliness. Leafstalks *woolly.* Leaves 2″–3″. Height to 5′. Flowers March–April. Fruits purplish, May–June. Nantucket Juneberry has small leaves. Foliage of Nova Scotia Juneberry is leathery. Fernald Juneberry leaves are hairless. Oblongleaf Juneberry is taller and lacks underground runners. Running Juneberry has almost circular leaves. Mostly Coastal Plain woods; s. New Jersey, se. Pennsylvania, and centr. Virginia to Georgia and Alabama.

NANTUCKET JUNEBERRY **Not illus.**

Amelanchier nantucketensis Bickn.

Recognition: Like Coastal Juneberry but with *small, hairless, shiny* leaves with hairy leafstalks. Leaves 1″–1½″. Height to 5′. Flowers May–June. Fruits June–July. Nantucket I. and Martha's Vineyard, Massachusetts.

NOVA SCOTIA JUNEBERRY **Not illus.**

Amelanchier lucida Fern.

Recognition: Like Coastal Juneberry but with *leathery, shiny, often nearly circular* leaves with leafstalks hairless. Leaves 1″–4″. Height to 5′. Flowers June. Fruits July–Aug. Dry or peaty soils; Nova Scotia.

FERNALD JUNEBERRY **Not illus.**

Amelanchier fernaldii Wieg.

Recognition: Like Coastal Juneberry but with *hairless, thin, egg-shaped* or *oblong* leaves. Leaves 2″–4″. Height to 4′. Flowers June–July. Fruits dark purplish, Aug.–Sept. Thickets and shores; Newfoundland and e. Quebec to Cape Breton I. and Prince Edward I.

OBLONGLEAF JUNEBERRY **p. 342**

Amelanchier canadensis (L.) Medic.

Recognition: An upright tall shrub or small tree growing in clumps. Leaves *oblong, fine-toothed,* mostly rounded at tips,

ROUNDLEAF JUNEBERRY **p. 342**
Amelanchier sanguinea (Pursh) DC.

Recognition: A rather low shrub with arching or straggling stems. Leaves coarse-toothed, blunt-tipped, toothed to base or nearly so, hairy beneath when young but soon hairless except for leafstalk; shape somewhat oblong to nearly circular. Clumped or not, sometimes spreading by underground stems. Winter buds dull, not shiny. Leaves 1″–3″. Height to 9′ (23′). Flowers May–June. Fruits purple, July–Aug.

Similar species: Among coarse-toothed juneberries, only (1) Alderleaf and (2) Gaspé are clumped and have leaves blunt-tipped and toothed nearly to base. They are more western and northern and have less arched or straggling stems. When not clumped, this species can be separated from (3) Large-flowered by its green leaves and from (4) Huron Juneberry by dull, nongummy buds.

LARGE-FLOWERED JUNEBERRY **Not illus.**
Amelanchier amabilis Wieg.

Recognition: Like the Roundleaf but with leaves covered with *whitish bloom* or powder. Flower petals somewhat broader than in other juneberries. Does not spread by underground shoots to form clumps. Woods and thickets; sw. Quebec and s. Ontario to New York.

HURON JUNEBERRY **Not illus.**
Amelanchier huronensis Wieg.

Recognition: Somewhat resembling Roundleaf Juneberry and sometimes considered identical. Typically upright, *not clumped,* and with *shiny, gummy winter buds.* Leaves 1″–4″. Height to 21′. Flowers May–July. Fruits July–Aug. Rocky soils; centr. and w. Ontario to n. Michigan, Wisconsin, and Minnesota.

WIEGAND JUNEBERRY **Not illus.**
Amelanchier wiegandii Nielsen

Recognition: Of coarse-toothed juneberries only this and the next have *short-pointed* leaf tips. This species is taller, does not occur in clumps, and is more widespread. Leaves 1″–3″. Height to 21′. Flowers May–July. Fruits July–Aug. Newfoundland and Ontario to Nova Scotia, n. New England, New York, n. Michigan, n. Wisconsin, and n. Minnesota.

MINNESOTA JUNEBERRY **Not illus.**
Amelanchier mucronata Nielsen

Recognition: Differs from the last in being *low, clumped,* and of

A Key to the Willows

	Name	*Page*
1. Plants creeping and very low, often with underground stems	**DWARF WILLOWS**	179–81
1. Plants upright:		
2. Leaves not toothed, though sometimes wavy-edged:		
3. Leaves hairy, silky, or woolly beneath:		
4. Leaf undersides and twigs bearing loose white wool	**HOARY**	254
4. Leaf undersides and twigs not bearing loose white wool:		
5. Leaf undersides and twigs gray-hairy:		
6. Leaf bases wedge-shaped:		
7. Leaves up to 5″ long; plant height to 13′	**TALL PRAIRIE**	250
7. Leaves under 3″ long; plant height to 4′	**DWARF PRAIRIE**	251
6. Leaf bases U- to heart-shaped:		
8. Leaves over 2″ long, tips sharp; plant to 17′ tall	**QUEBEC**	251
8. Leaves under 2″ long, tips blunt; plant to 1½′ tall	**CANADA**	251
5. Leaf undersides whitish-silky:		
9. Twigs not coated with a white powder:		
10. Leaves shiny above; stipules conspicuous	**QUEBEC**	251
10. Leaves dull above; stipules small or absent:		
11. Leaves under 4″ long; plants to 6′ tall:		
12. Leaves quite narrow	**SILVERLEAF**	252
12. Leaves wider, egg-shaped to circular	**UNGAVA**	252
11. Leaves 6″–10″ long; plants to 25′ tall	**OSIER**	252
9. Twigs coated with a white powder:		
13. Leaves strongly whitened beneath, somewhat leathery	**ONTARIO**	252
13. Leaves only pale beneath, thin	**FLATLEAF**	253
3. Leaves essentially hairless beneath:		
14. Leaves mostly somewhat paired	**BASKET**	258
14. Leaves definitely alternate:		
15. Leaves thin, not leathery; plants to 10′ tall:		
16. Leaf edges rolled	**TALL PRAIRIE**	250

	Name	*Page*
16. Leaf edges not rolled:		
17. Widespread in North; catkins stalkless	**FLATLEAF**	**253**
17. Known only from Newfoundland; catkins with stalks	**NEWFOUNDLAND**	**253**
15. Leaves thicker, somewhat leathery; plants under 3′ tall:		
18. Plants not spreading by underground stems; leaf edges not rolled:		
19. Twigs and buds hairy; leaves quite leathery, nearly circular; stipules obvious	**LIMESTONE**	**253**
19. Twigs and buds hairless; leaves somewhat leathery, more or less egg-shaped; stipules small or lacking	**MOUNT ALBERT**	**253**
18. Plants spreading by underground stems; leaf edges rolled:		
20. Branches upright; bogs at low elevations	**BOG**	**254**
20. Branches spreading; mountain areas	**SPREADING**	**254**
2. Leaves toothed:		
21. Leaves green and mostly hairless, not gray-hairy, whitened, or white-hairy beneath:		
22. Leaf tips pointed:		
23. Leaves very narrow, not long-pointed, leathery, or aromatic:		
24. Leaf teeth widely spaced; leaf bases tapered	**SANDBAR**	**255**
24. Leaf teeth closely spaced:		
25. Leaf bases tapered; stipules small or lacking	**CRACK**	**256**
25. Leaf bases rounded; stipules conspicuous	**BLACK**	**256**
23. Leaves wider and either long-pointed, leathery or aromatic:		
26. Leaves not spicy-scented when crushed; leaves quite long-pointed; stipules usually conspicuous:		
27. Leaves thick, rather leathery; leafstalks with glands near or on the leaf base:		
28. Leaves with very long, tail-like tips	**SHINING**	**256**
28. Leaves with only moderately long tips	**BAYLEAF**	**256**

	Name	*Page*
27. Leaves thin, not leathery; leafstalks without glands:		
29. Twigs gray-hairy	**HEARTLEAF**	**256**
29. Twigs hairless	**RIGID**	**257**
26. Leaves spicy-scented when crushed; stipules small or lacking	**BALSAM**	**257**
22. Leaf tips blunt; stipules usually obvious:		
30. Leafstalks short; stipules broad	**MYRTLELEAF**	**257**
30. Leafstalks long; stipules heart-shaped	**BLUNTLEAF**	**257**
21. Leaves gray-hairy, whitened or white-hairy beneath:		
31. Leaves gray-hairy at least beneath:		
32. Leaves wide, more or less egg-shaped:		
33. Leaves with long-pointed tips, bases sometimes heart-shaped; twigs gray-hairy	**HEARTLEAF**	**256**
33. Leaves with short-pointed tips:		
34. Leaves without heart-shaped bases:		
35. Twigs densely gray-woolly; leaves dull above	**BEBB**	**254**
35. Twigs hairless or nearly so; leaves shiny above	**GOAT**	**255**
34. Leaves with heart-shaped bases, often short-stalked	**SANDDUNE**	**255**
32. Leaves narrow, canoe-shaped:		
36. Leaves hairy on both surfaces	**EUROPEAN GRAY**	**255**
36. Leaves not hairy above	**NORTHERN GRAY**	**255**
31. Leaves whitened or white-hairy beneath:		
37. Leaves usually opposite or nearly opposite; leaves narrow with teeth only near the tips	**BASKET**	**258**
37. Leaves alternate:		
38. Leaves toothed mostly above the middle; teeth rather coarse:		
39. Leaves wide, elliptic; stipules often large and obvious	**PUSSY**	**258**
39. Leaves narrower; stipules small or lacking	**MEADOW**	**260**
38. Leaves toothed to the base or nearly so:		
40. Leaves with the tips long-pointed:		
41. Stipules small or lacking:		
42. Twigs very long, drooping; leaves hairless or silky	**WEEPING**	**259**

cally *gray-hairy* beneath. From n. New York and n. Michigan southward, however, var. *hyporhysa* Fern. has leaves hairless or nearly so beneath. Leaves widest above middle, edges rolled slightly and base *wedge-shaped*. Twigs usually gray-hairy but sometimes hairless. Stipules small or lacking. Leaves 1″–5″. Height to 13′. Flowers March–June.

Similar species: Of upright willows whose leaves are not toothed, this species, (1) Quebec, (2) Dwarf Prairie, and (3) Canada Willows have densely gray-hairy twigs and leaf undersides. Gray-green color and wedge-shaped leaf bases distinguish the 2 prairie willows from the others. Small size of Dwarf Prairie Willow and Canada Willow (below) usually separate them from Tall Prairie Willow. (4) Basket Willow (Plate 56) sometimes has leaves similar to hairless form but purplish twigs are distinctive. (5) Flatleaf Willow (p. 253) lacks rolled leaf edges.

DWARF PRAIRIE WILLOW **p. 344**

Salix humilis var. *microphylla* (Anderss.) Fern.

Recognition: Now classified (by Fernald but not by all botanists) as a dwarf variety of Tall Prairie Willow. It is distinctive, though variable. A low shrub with small leaves; leaf undersides and twigs *densely gray-hairy*. Leaf bases wedge-shaped. Leafstalks much longer than side buds. Leaves ½″–3″. Height to 4′. Flowers March–June.

Similar species: (1) See Tall Prairie Willow. (2) Canada Willow has broader leaf bases, longer leafstalks.

CANADA WILLOW *Salix brachycarpa* Nutt. **Not illus.**

Recognition: A very low shrub like Dwarf Prairie Willow but leaf undersides *white- or gray-hairy* to woolly. Leaves toothless, small, oblong-shaped, blunt-tipped, and strongly overlap each other. Leaf bases U-shaped; leafstalks shorter than the very hairy buds. Leaves ½″–1½″. Height to 1½′. Flowers June–Aug. Dry soils; e. Quebec, n. Quebec, and British Columbia to Manitoba, Colorado, Utah, and Oregon.

QUEBEC WILLOW *Salix laurentiana* Fern. **Not illus.**

Recognition: A shrub or small tree. Leaves dark green and *shining* above and *white- or gray-hairy* beneath, bases wide, sometimes heart-shaped, tips slightly extended, edges wavy-edged or not toothed. Leafstalks and twigs densely gray-hairy. Stipules usually conspicuous. Leaves 2″–8″. Height to 17′. Flowers June. Only willow with leaf edges wavy-toothed or not toothed and with leaves hairy beneath and shining above. Sometimes considered a hybrid involving the Broadleaf Willow. Gulf of St. Lawrence, n. Quebec, and James Bay to e. Quebec, and nearby islands.

SILVERLEAF WILLOW **Not illus.**
Salix argyrocarpa Anderss.

Recognition: A low shrub with small leaves. Leaves wavy-edged, usually shaped like those of Dwarf Prairie Willow and sometimes blunt-tipped, but quite *silvery-silky* beneath. Leaves 1″–2½″. Height to 5′. Stipules small or lacking. Flowers June–Aug. Of upright willows whose leaves are not toothed and twigs not white-coated, only 4 are whitish-silky beneath. The others are either gray-hairy, white-woolly, or hairless. This species may be distinguished from Ungava Willow by its narrower leaves and from Osier and Ontario Willows by its shorter leaves, height, and arctic-alpine distribution. Arctic tundras and barrens; Labrador to the mountains of e. Quebec and New Hampshire.

UNGAVA WILLOW *Salix cordifolia* Pursh **Not illus.**

Recognition: A variable low arctic-alpine shrub. Leaves *wide,* from shape of Bebb Willow to nearly circular, *densely silky,* but *wavy-edged* or *not toothed.* Twigs quite silky. Leaves typically heart-shaped at base but 4 varieties with rounded leaf bases are known; a 5th is hairless. Recognizable with certainty only from minute characteristics of reproductive parts, unless leaf bases are heart-shaped; then its toothless leaves are distinctive. Stipules lacking. Leaves ½″–4″. Height to 6′. Flowers June–July. Silverleaf Willow has narrower leaves with wedge-shaped bases. Osier Willow has longer, narrower leaves. Ontario Willow has twigs covered with white powder. See Taller Willows (p. 181). Rocky soils; Greenland and e. Arctic to Newfoundland, Nova Scotia, and e. Quebec.

OSIER WILLOW *Salix viminalis* L. **Not illus.**

Recognition: A shrub or small tree with distinctive leaves that are *very long, narrow,* pointed, *toothless,* and *silvery-hairy* beneath. Twigs and branches very long and flexible. Stipules small or lacking. Leaves 6″–10″. Height to 25′. Flowers April–June. Among willows with toothless leaves white-hairy beneath, this is the only one with long narrow leaves. Escaped from cultivation; Newfoundland and Quebec to Nova Scotia and New England.

ONTARIO WILLOW *Salix pellita* Anderss. **Not illus.**

Recognition: A large shrub to small tree with thick, *toothless* leaves narrow like those of Hoary Willow. Foliage *whitened beneath,* often silky-hairy and somewhat *long-pointed.* Twigs covered with *white powder.* Stipules small or lacking. Leaves 2″–5″. Height to 30′. Flowers May–June. When leaves are hairy, whitened twigs distinguish this species from preceding 2. Of following several species with toothless hairless leaves, only Flatleaf also has white-powdered twigs. Its leaves are wider and not long-pointed. Damp thickets; Newfoundland, s. Labrador, and n. Ontario to Nova Scotia, n. New England, n. Michigan, and westward.

FLATLEAF WILLOW *Salix planifolia* Pursh **Not illus.**
Recognition: A variable low shrub with leaves elliptic, hairless, dark green above, whitened beneath, essentially toothless, though sometimes with a few tiny teeth. Hairless twigs sometimes covered with whitish powder. Stipules small or lacking. Catkins without stalks. Leaves 1″–3″. Height to 10′. Flowers June–Aug. Of 8 upright willows that may have hairless, toothless leaves, this species is distinctive when twigs have whitish coating. Otherwise, the group is divided into those with leaves thickened and generally short with rolled margins (see Limestone Willow) and those with longer thinner leaves. In latter group, this species very similar to 3 little-known Newfoundland willows (next), except that its catkins have no stalks. Basket Willow (p. 258), usually with toothed leaves, can be distinguished by nearly opposite leaves when leaf teeth are lacking. See also Tall Prairie and Northern Gray Willows (pp. 250, 255). Tundras and damp thickets; Newfoundland and Labrador to mountains of e. Quebec and n. New England and westward to Alberta.

NEWFOUNDLAND WILLOWS **Not illus.**
Salix pedunculata Fern., *S. amoena* Fern., *S. ancorifera* Fern.
Recognition: Similar to Flatleaf but with stalks of catkins leafy. The several species are separable principally by minute floral characteristics. Stipules small or lacking. Local; Newfoundland.

LIMESTONE WILLOW **Not illus.**
Salix calcicola Fern. & Wieg.
Recognition: A ground-hugging or very low gnarled shrub with egg-shaped to nearly circular hairless leaves and hairy twigs and buds. Leaves leathery and short-stalked, edges not rolled. Stipules usually obvious. Does not spread by underground stems. Leaves ½″–2½″. Height to 1½′. Flowers June. Mount Albert Willow also low with leathery leaves and does not spread by underground stems, but its twigs are hairless. See Taller Willows (p. 181). Limestone and other rocky soils; Newfoundland, Baffin I., and Keewatin to e. Quebec and ne. Ontario.

MOUNT ALBERT WILLOW **Not illus.**
Salix chlorolepis Fern.
Recognition: Another very low shrub with short, egg-shaped, hairless, and somewhat leathery leaves. Twigs hairless. Leaf

edges not rolled. Stipules small or lacking. Leaves to 1″. Height to 7″. Mount Albert, Quebec. See Taller Willows (p. 181) and next 2 species.

BOG WILLOW *Salix pedicellaris* Pursh **Not illus.**
Recognition: A low, clumped plant, spreading by underground stems. Leaves more or less elliptic, leathery, hairless, with rolled edges. Branches erect. Stipules small or lacking. Leaves ½″–2″. Height to 3′. Flowers May–July. Spreading Willow also is low, with leathery leaves, and spreads by underground stems. It has more spreading branches and grows on uplands. Bog Willow grows in acid bogs at low elevations; Newfoundland, Labrador, and British Columbia to n. New Jersey, Pennsylvania, Indiana, n. Iowa, Manitoba, and Oregon.

SPREADING WILLOW *Salix hebecarpa* Fern. **Not illus.**
Recognition: Very similar to Bog Willow (sometimes interpreted as a hybrid of it) but branches less upright and stalks of catkins thick and hairy rather than thin and hairless. Known only from rocky soils on Mount Albert, Quebec. See also Taller Willows (p. 181).

HOARY WILLOW *Salix candida* Flügge **p. 344**
Recognition: A medium-sized shrub with narrow leaves with rolled edges. Our only upright willow with leaves lacking teeth and with leaf undersides and twigs bearing *loose white wool.* Stipules usually conspicuous. Leaves 1½″–5″. Height to 7′. Flowers April–June.

Willows with Toothed Leaves, Gray-hairy At Least Beneath

(*Plate 55 contd., p. 344*)

BEBB WILLOW *Salix bebbiana* Sarg. **p. 344**
Recognition: A variable shrub or small tree. Leaves wide, coarse-toothed, less commonly nearly without teeth. Foliage dull above, *grayish-woolly* and veiny beneath. Twigs gray-woolly. Stipules small or lacking. Leaves 2″–5″. Height to 25′; diameter to 8″. Flowers April–June.
Similar species: Only upright species with wide, coarse-toothed and gray-hairy leaves with tapered tips and bases. Broad leaves and moderate plant size help separate it from other willows with gray-hairy leaves, even when teeth of leaves are obscure. Goat Willow has nonwoolly twigs and shining upper leaf surfaces.

GOAT WILLOW *Salix caprea* L. **Not illus.**
Recognition: Like Bebb Willow with *wide*, more or less egg-shaped leaves, but these may bear only inconspicuous teeth above middle. Moderately gray-hairy beneath; hairless and shining above. Leafstalks mostly ⅜″–¾″. Twigs hairless or slightly hairy. Stipules small. Leaves 1″–5″. Height to 25′. Flowers March–April. See Bebb Willow. Sanddune Willow has heart-shaped, short-stalked leaves. Early leaves of Pussy Willow (Plate 56) resemble those of this species but leaf teeth and stipules are more conspicuous in Pussy Willow. European; escaped from plantings; New England to Ohio and Maryland.

SANDDUNE WILLOW *Salix syrticola* Fern. **Not illus.**
Recognition: Like Goat Willow in having wide fine-toothed leaves gray-hairy beneath, but leaves more or less *heart-shaped* at base and stalks usually only ⅛″–⅜″. Twigs gray-hairy or -woolly. Stipules usually large. Leaves 1½″–4″. Height to 10′. Flowers May–June. See Heartleaf Willow, p. 256 (usually hairless). Sanddune and Heartleaf Willows are considered identical by some botanists. Great Lakes dunes; w. Ontario, Michigan, Indiana, ne. Illinois, and e. Wisconsin.

EUROPEAN GRAY WILLOW *Salix cinerea* L. **Not illus.**
Recognition: An Old World shrub or small tree. Leaves wedge-shaped like Tall Prairie Willow but distinctly though *finely toothed.* Both leaf surfaces and twigs densely gray-hairy. Stipules small or lacking. Leaves 1″–4″. Flowers April–May. Escaped; Nova Scotia and Massachusetts.

NORTHERN GRAY WILLOW **Not illus.**
Salix paraleuca Fern.
Recognition: Similar to European Gray Willow but gray-hairy leaves dull and not hairy above. Leaves 1″–4″. Height to 13′. Flowers June. Considered by some botanists to be a hybrid involving Flatleaf Willow, which is not toothed. E. and ne. Quebec.

Willows with Toothed, Mostly Hairless Leaves, Green on Both Sides

(*Plate 55 contd., p. 344*)

SANDBAR WILLOW *Salix interior* Rowlee **p. 344**
Recognition: A shrub or small tree with long, quite narrow, hairless or rarely silky, short-stalked leaves. Teeth small but widely spaced; leaf bases tapered. Twigs hairless. Stipules small or lacking. Leaves 2″–6″. Height to 20′. Flowers May–June.

Similar species: Of willows that have toothed, hairless, point-tipped leaves green on both sides, only 3 have leaves also very narrow. In contrast to (1) Crack and (2) Black Willows, leaves of this species have widely spaced teeth.

BLACK WILLOW *Salix nigra* Marsh. **pp.** ***11,*** **344**
Recognition: A shrub or tree with long narrow leaves but with bases rounded or V-shaped. Leaves fine-toothed, hairless except for hairy glandless stalks. Twigs hairless. Stipules usually conspicuous. Leaves 1″–6″. Height 10′–40′ (120′); diameter 2″–24″ (96″). Flowers April–June.
Similar species: See (1) Sandbar and (2) Crack Willows.

CRACK WILLOW *Salix fragilis* L. **Not illus.**
Recognition: This European tree has leaves like Black Willow but with *tapering* bases. Leafstalks may bear glands. Buds somewhat sticky; twigs hairless, very brittle at base. Stipules small or lacking. Leaves 1″–7″. Height 50′–70′ (80′); diameter 2′–3′ (4′). Flowers April–June. See Black Willow. Spread from cultivation; Newfoundland, Ontario, and Minnesota to Virginia, Kentucky, Kansas.

SHINING WILLOW *Salix lucida* Muhl. **p. 344**
Recognition: The *extremely long-pointed* leaves are distinctive. They are hairless, fine-toothed, and usually rather leathery. Leafstalks have heavy *glands* near or at leaf bases. Twigs hairless; stipules usually large. Var. *intonsa* Fern. (Newfoundland and Ontario to Maine and n. Indiana) has hairy leaf undersides and twigs. Leaves 2″–7″. Height 10′–15′ (25′); diameter 1″–6″ (12″). Flowers April–June.
Similar species: This and (1) Bayleaf, (2) Heartleaf, and (3) Rigid Willows have toothed leaves, green on both sides, which might be considered long-pointed. This species and Bayleaf Willow have leathery leaves with glandular leafstalks; this one is unique in having very long tail-like leaf tips.

BAYLEAF WILLOW *Salix pentandra* L. **Not illus.**
Recognition: Like Shining Willow in having toothed, hairless, leathery leaves with glandular leafstalks; but leaves of this European species only *moderately long-pointed.* Twigs hairless. Leaves 1″–4″. Height to 25′. Flowers May–June. Shining Willow has longer leaf tips; Heartleaf has nonleathery leaves. Spread from cultivation; Nova Scotia and Ontario to Maryland, Ohio, and Iowa.

HEARTLEAF WILLOW *Salix cordata* Michx. **p. 344**
Recognition: Differing from Bayleaf Willow in having leaves *not leathery* and sometimes barely heart-shaped at base.

Though usually hairless at maturity, young leaves, and sometimes mature ones, may be gray-hairy on both surfaces. They have long-pointed tips. Leafstalks long-hairy; twigs densely gray-hairy. Stipules usually conspicuous. Leaves 1″–5″. Height to 5′. Flowers May–June.

Similar species: Only this and (1) Rigid Willow regularly have nonleathery toothed leaves, green beneath, with moderately long-pointed tips. Rigid Willow has hairless twigs. When gray-hairy beneath, Heartleaf Willow is the only species so marked which also has prolonged leaf tips. (2) Balsam Willow leaves may have heart-shaped bases, but when crushed have firlike fragrance.

Remarks: Sanddune Willow (p. 255) is considered by some botanists to be only a hairy form of this species.

RIGID WILLOW *Salix rigida* Muhl. **Not illus.**

Recognition: Very similar to Heartleaf Willow but with more narrow, pointed leaves and usually with hairless leaves and twigs. Leaves 1″–5″. Height to 10′. Flowers April–June. Damp soils; s. Newfoundland and Ontario to N. Carolina, Mississippi, Arkansas, and Kansas.

BALSAM WILLOW *Salix pyrifolia* Anderss. **Not illus.**

Recognition: A shrub or small tree with fine-toothed, hairless, broad, thin, egg-shaped to heart-shaped, point-tipped leaves on long slender stalks. Foliage has a pleasant firlike *aromatic* odor when crushed. Twigs hairless. Stipules small or lacking. Leaves 1″–5″. Height to 20′. Flowers May–Aug. Woods and thickets; Newfoundland, s. Labrador, and n. British Columbia to Maine, n. New York, Michigan, Wisconsin, Minnesota, and Saskatchewan.

MYRTLELEAF WILLOW **Not illus.**
Salix myrtillifolia Anderss.

Recognition: A low, sometimes creeping, shrub with blunt-tipped oblong leaves that are rather large-toothed, hairless, and green on both sides. Leaf bases rounded; leafstalks short and stout. Broad stipules often obvious. Leaves 1″–3½″. Height to 3′. Flowers June–July. Only this and Bluntleaf Willow have toothed, hairless leaves green on both sides and with rounded tips. See dwarf willows (pp. 179–81). Damp soils; Newfoundland, se. Labrador, and Alaska to e. Quebec, n. Ontario, Manitoba, and s. British Columbia.

BLUNTLEAF WILLOW *Salix obtusata* Fern. **Not illus.**

Recognition: Similar to the more widespread Myrtleleaf Willow (and sometimes considered a variety of it), but with long and slender leafstalks and obvious *heart-shaped stipules.*

Some leaves may be nearly circular and occasionally young leaves are somewhat woolly. See Taller Willows (p. 181). Leaves 1″–2″. Height to 3′. Flowers June. Gravelly soils; local; Quebec.

Willows with Toothed Leaves, Whitened or White-hairy Beneath

(*Plate 56, p. 346*)

BASKET WILLOW *Salix purpurea* L. **p. 346**

Recognition: A tall shrub with narrow leaves that have small teeth only near tips, or these lacking. Leaves usually opposite or nearly opposite each other, hairless, and whitened beneath. Twigs purplish and hairless. Leaves 1″–5″. Height to 20′. Flowers April–May.

Similar species: Leaf type and nearly opposite leaves and buds are distinctive. Flatleaf Willow has similar but always toothless and alternate leaves.

Remarks: A European import; twigs used to make baskets.

PUSSY WILLOW *Salix discolor* Muhl. **pp.** *11*, **346**

Recognition: A shrub or tree. Leaves elliptic, whitened beneath, hairless, except immediately upon unfolding, or more rarely rusty-hairy beneath, toothed *mostly above middle.* Twigs either hairless or somewhat long-hairy. Stipules often large. Leaves 2″–5″. Height to 30′. Flowers Feb.–May.

Similar species: Except when leaves are hairy, the leaf-tooth pattern is rather distinctive. (1) When hairy, it most resembles Goat Willow (p. 255) but leaves have more prominent teeth. (2) One variety of Meadow Willow has similar but narrower leaves; stipules are small or lacking.

Remarks: Furry flower catkins are a symbol of spring.

PEACHLEAF WILLOW *Salix amygdaloides* Anderss. **p. 346**

Recognition: A shrub or small tree. Leaves *long-pointed*, fine-toothed, hairless, somewhat leathery, whitened beneath. The hairless, yellow, flexible twigs *droop moderately.* Stipules *small or lacking.* Leaves 3″–7″. Height to 40′. Flowers April–June.

Similar species: (1) Ward and (2) Missouri Willows also have long-pointed leaves, but their stipules are large and leafy. (3) Weeping Willow has longer, more flexible twigs and may have silky leaf undersides.

WARD WILLOW *Salix caroliniana* Michx. **Not illus.**

Recognition: A small southern tree. Leaves very narrow, *long-pointed*, hairless, whitened or white-hairy beneath. Twigs

Leaves ½″–4″. Height to 4′. Flowers June–Aug. See Taller Willows (p. 181). Rocky soils; Labrador and n. Quebec to Newfoundland and e. Quebec, and in Montana, Alberta, Oregon, and British Columbia.

FELTED WILLOW *Salix coactilis* Fern. **Not illus.**
Recognition: Leaves shaped like Silky and Meadow Willows but slightly wider and *densely white-hairy* beneath. They have *coarse* teeth like those pictured for Bebb Willow. Stipules usually obvious on vigorous shoots; twigs brittle at base. Leaves 2″–6″. Height to 12′. Flowers May. The only coarse-toothed willow with leaves densely white-hairy beneath. Damp soils; w. New Brunswick and s. Quebec to centr. Maine.

WOOLLY WILLOW *Salix cryptodonta* Fern. **Not illus.**
Recognition: Similar to Felted Willow but leaves with obscure, *tiny, rounded* teeth, rolled edges, and loosely white-woolly beneath. Stipules usually conspicuous. Height to 13′. Flowers May–June, catkins expanding before leaves unfold. Var. *albovestita* (C. R. Ball) Fern. of Broadleaf Willow is very much like this species but occurs on sand dunes near Great Lakes. Its catkins come out with leaves or afterwards. Woolly Willow grows on wet soils; Newfoundland and e. Quebec.

WHITE WILLOW *Salix alba* L. **p. 346**
Recognition: This European tree is the only willow with leaves white-hairy *above and below*. Twigs silky, not brittle at base and sometimes slightly drooping. Common varieties, *calva* C. F. W. Mey. and *vitellina* (L.) Stokes, and some hybrids, however, are hairless. Stipules mostly lacking. Leaves 2″–6″. Height to 80′. Flowers April–May.
Similar species: When hairless, similar to the remaining willows that have fine-toothed leaves with whitish, hairless undersides, but may be separated from (1) Broadleaf and (2) Yellow Willows by absence of stipules; from (3) Autumn Willow also by narrower nonleathery leaves and lack of glands on leafstalks; from (4) Meadow Willow by taller size and firmer foliage. (5) When drooping, nonbrittle twigs distinguish it from Weeping Willow.

MEADOW WILLOW *Salix gracilis* Anderss. **p. 346**
Recognition: A shrub. Leaves narrow, nonleathery, shiny green above, whitish beneath, hairless or white- to rusty-silky beneath, toothed mostly *above middle*. Var. *textoris* Fern. has coarse-toothed leaves. Twigs hairless, sometimes whitened, not brittle at base. Stipules *absent* or very small. Leaves 1″–4″. Height to 10′. Flowers May–June.
Similar species: Limited leaf teeth and lack of obvious stipules distinguish this species even when silky leaf undersides are present. (1) Occasional coarse-toothed specimens have narrower

leaves than Pussy Willow, which also has obvious stipules on vigorous shoots. (2) Variants of White Willow are taller, leaves at least slightly silky and dull above.

BROADLEAF WILLOW **Not illus.**
Salix glaucophylloides Fern.

Recognition: A northeastern shrub or small tree. Leaves narrow to almost egg-shaped, semileathery, fine-toothed, shiny dark green above, whitened beneath; bases tapering to heart-shaped. Twigs dark and hairless except in uncommon form *lasioclada* Fern., which has gray-hairy twigs. Var. *glaucophylla* (Bebb) Schneid., of Great Lakes dunes from New York to Ontario and Michigan, has white-woolly twigs and leaves. Stipules usually present and conspicuous. Leaves 1″–6″. Height to 17′. Flowers May–June. Typical form resembles Yellow Willow. Var. *glaucophylla* is most like Felted Willow, but has fine-toothed leaves. White Willow has leaves hairy also above. Quebec Willow is sometimes considered to be a hybrid involving this species but its leaves are gray-hairy beneath. Rocky and sandy soils; Newfoundland, n. Ontario, and Wisconsin to n. Maine, Ohio, and Illinois.

YELLOW WILLOW *Salix lutea* Nutt. **Not illus.**

Recognition: Similar to Broadleaf Willow, but leaves *yellow-green above* and twigs *yellow.* Streamsides, n. Ontario, Northwest Territories, and British Columbia to nw. Iowa, Nebraska, Utah, and California.

AUTUMN WILLOW *Salix serissima* (Bailey) Fern. **p. 346**

Recognition: A shrub with rather narrow leaves hairless, green above, white beneath, and *quite leathery.* Leafstalks carry large *glands* at or on leaf bases. Fruits released in late summer or in autumn. Twigs hairless. Leaves 2″–5″. Height to 15′. Flowers May–July.

Similar species: Among the species with hairless but whitened leaves, the only one with leathery leaves and with glands on leafstalks.

Miscellaneous Plants with 3 Bundle Scars (1)

(*Plate 57, p. 348*)

Of the several plants of this group, the first 6 are related species of the waxmyrtle family. These plants are among the few outside the pea (legume) family which enrich the soil through nitrogen-fixing bacteria contained in root nodules. The crushed foliage has

larger, more egg-shaped, point-tipped, thin leaves. Resin-dots few or lacking on the often somewhat hairy upper surface. Twigs gray-hairy; buds whitish; true end buds present. Leaves 1″–5″. Usually shrubby, but height to 35′; diameter to 6″. Flowers May–July. Fruits hairy, June–April.
Similar species: See (1) Sweetgale and (2) Black Bayberry.
Remarks: Many songbirds (notably myrtle warbler) and also ruffed grouse, bobwhite, and pheasant eat the fruits.

BLACK BAYBERRY *Myrica heterophylla* Raf. **Not illus.**
Recognition: Somewhat similar to Northern Bayberry, but with leathery, *evergreen* leaves and *black-hairy* twigs. Flowers April–June. Coastal Plain; s. New Jersey to Florida and Louisiana.

SWEETFERN *Comptonia peregrina* (L.) Coult. **p. 348**
Recognition: Any time a "fern" is found growing in our part of the world as a low bush with woody stem and branches, the observer is viewing this plant. Foliage *fernlike.* Twigs *aromatic* when crushed; usually hairy. Buds have 4 or more scales; end buds false. Leaves 3″–6″. Height to 5′. Flowers April–June. Fruits small nuts, not waxy, Sept.–Oct.
Similar species: Unique when in leaf. In winter, the only aromatic plant among those with 3 bundle scars, false end buds, and buds with more than 4 scales.
Remarks: Ruffed and sharptail grouse and whitetail deer feed on plant.

BEECH *Fagus grandifolia* Ehrh. **pp.** *10,* **348**
Recognition: A tall tree with distinctive *smooth gray bark, slender many-scaled buds,* and elliptic or egg-shaped, *coarse-toothed* leaves. Twigs hairless or somewhat long-hairy, encircled or almost encircled by stipule scars at each leaf scar. Leaves 1″–5″. Height 60′–80′ (120′); diameter 2′–3′ (4′). Flowers April–May. Fruits small *triangular nuts,* edible, Sept.–Oct.
Similar species: Combination of bark, twig, bud, and leaf characteristics is unique. (1) Yellowwood (Plate 30) has similar bark but compound leaves; not common. (2) See Chestnut (p. 264). Several oaks (Plate 47) have similar leaves but buds and leaves are clustered at twig tips.
Remarks: An important timber species. Quality of wood only fair but used for cheap furniture, tool handles, veneer, shoe lasts, and fuel. Beeches are planted widely for ornament. Fruits eaten by ruffed grouse, wild turkey, bobwhite, pheasant, black bear, raccoon, red and gray foxes, whitetail deer, cottontail rabbit, gray, red, and flying squirrels, porcupine, and opossum.

COMMON WITCH-HAZEL *Hamamelis virginiana* L. **p. 348**
Recognition: A shrub or small tree with *wavy-toothed, uneven-*

Similar species: The apple group is a collection of 6 species. The 3 native species are almost always thorny, have sharp buds, and are discussed on pages 195–97. The 3 imported species below occasionally may be somewhat thorny. This species is unlike other apples in lacking sharp leaf teeth. Domestic Pear is mostly hairless, more often thorny, usually has long, not round, fruits and has 1 or several strong upright branches, giving the tree a pointed rather than round-topped crown shape. In winter this apple has hairier twigs, blunter buds, and more-raised leaf scars than the pear.

Remarks: The exact origin is lost in antiquity but the etymology of the name indicates that it originated in the western Himalayas and traveled westward by way of northern Persia, Asia Minor, the Caucasus, and the Mediterranean countries. The apple of the Bible is believed to have been not our northern fruit but the apricot, still common in the Holy Land. The Domestic Apple locally gone wild is an important wildlife food eaten by deer, pheasant, mourning dove, gray fox, and many other animals.

CHINESE APPLE *Pyrus prunifolia* Willd. **Not illus.**

Recognition: Asiatic, similar to Domestic Apple but leaves wider, sharp-toothed, hairless except on veins. Twigs somewhat hairy but not woolly. Flowers May–June. Fruits about ¾″ across. Escaped; Nova Scotia and New Brunswick to New England and Pennsylvania.

SIBERIAN CRABAPPLE *Pyrus baccata* L. **Not illus.**

Recognition: Another Asiatic; similar to Chinese Apple but with long-pointed, sharp-toothed, hairless leaves. Twigs hairless, at least after early summer. Fruits usually less than ½″ across. Spread from cultivation; local.

DOMESTIC PEAR *Pyrus communis* L. **p. 350**

Recognition: Similar to Domestic Apple but nearly hairless, more often thorny, with *elongate fleshy fruits*, and usually with several strong upright branches, making a *narrow-topped* tree. Leaves 1″–3″. Height 20′–35′ (60′); diameter 6″–24″. Twigs of Chinese Pear are more hairy.

CHINESE PEAR **Not illus.**
Pyrus pyrifolia (Burm. f.) Nakai

Recognition: Similar to Domestic Pear but young leaves, at least, woolly and finely sharp-toothed. Fruits nearly round. Escaped; se. Virginia.

GROUNDSEL-TREE *Baccharis halimifolia* L. **p. 350**

Recognition: A shrub with *green angled twigs.* Wedge-shaped

SWEET-SPIRES *Itea virginica* L. **p. 352**

Recognition: A shrub with fine-toothed, elliptic leaves, buds occurring more than 1 above each leaf scar, *green twigs*, and *pith chambered* (sometimes faintly). Flower spears (hence the name) give rise to clusters of tiny dry fruits, frequently present. Leaves 1″–4″. Height to 10′. Flowers white, May–June. Fruits July–winter.

Similar species: No other species with 3 bundle scars has combination of chambered pith and green twigs.

COMMON SPICEBUSH *Lindera benzoin* (L.) Blume **p. 352**

Recognition: A *spicy-scented* shrub. Leaves elliptic, not toothed, hairless or nearly so. Stalked flower buds may flank stalkless 2- to 3-scaled leaf buds. End buds false. Red (rarely yellow) berries aromatic when crushed, as are leaves, twigs, and buds. Leaves 2″–6″. Height to 12′. Flowers yellow, March–May. Fruits July–Sept.

Similar species: Spicebush scent is distinctive once learned. (1) Sassafras (Plate 43) has a somewhat similar odor but has green, often forked twigs, 1 bundle scar, and, frequently, lobed leaves. (2) Pondspice (Plate 68) has only 1 bundle scar. (3) Sweetfern (Plate 57) has a less spicy odor, more than 3 bud scales, a more open habitat, and distinctive foliage. (4) Hairy Spicebush is hairy and more southern.

Remarks: Early land surveyors regarded this as an indicator of good agricultural land. The strongly aromatic twigs and leaves have been used for tea and dried berries have been powdered as a spice. Whitetail deer, cottontail rabbit, opossum, pheasant, bobwhite, ruffed grouse, and numerous songbirds eat twigs or fruits.

HAIRY SPICEBUSH **Not illus.**
Lindera melissaefolium (Walt.) Blume

Recognition: Similar to Common Spicebush but with *hairy* twigs and buds and narrow leaves that are *rounded* at the base and hairy at least beneath. Leaves 2″–6″. Height to 6′. Flowers Feb.–March. Fruits Sept.–Oct. Swamps; uncommon; Florida and Louisiana north to N. Carolina and s. Missouri.

ALTERNATE-LEAF DOGWOOD **p. 352**
Cornus alternifolia L. f.

Recognition: Among the many dogwoods (Plate 15) only this shrub or small tree does not have opposite leaves. Leaf veins tend to follow *leaf edges to tip*. Leaves have 1″–2″ stalks; often crowded (some may be opposite or whorled) toward tips of *greenish* twigs. Side twigs clustered near ends of central stem. Pith white. Buds have only 2 scales. Leaf scars narrow and raised; bundle scars 3. Hybrids with Red-osier Dogwood

(Plate 15) have intermediate characteristics. Leaves 2″–5″. Height to 25′. Flowers May–July. Fruits blue-black with red stems, July-Sept.
Remarks: Fruits eaten by many birds, including ruffed grouse. Twigs browsed by deer and rabbits.

SMOKETREE *Cotinus obovatus* Raf. **p. 352**
Recognition: One of the rarest American trees, this relative of the sumacs is found in only a few spots (see range opposite Plate 59). Wood yellow and odorous. Leaves wide, usually blunt-tipped; side buds with 2–4 scales and somewhat long-pointed. Name alludes to foot-long hazy sprays of small feathery fruits that resemble puffs of smoke. Foliage becomes a brilliant red in autumn. A European relative (*C. coggygria* Scop.) is used in landscaping. Leaves 3″–6″. Height 6′–25′ (35′); diameter 1″–12″ (14″). Flowers April–May. Fruits June–Sept.

CORKWOOD *Leitneria floridana* Chapm. **p. 352**
Recognition: A shrub or small tree related to poplars and other catkin-bearing plants but peculiar enough to be classified in a family by itself. Leaves narrow to elliptic, gray-hairy beneath. End buds clustered; much larger than some of side ones. The swamp habitat and 3 bundle scars separate this species from the oaks, which also have clustered buds at twig tips. Bark smooth and, like many other swamp trees, trunk swollen at base. Wood more buoyant than cork; local fishermen are said to use Corkwood blocks for net floats. Leaves 3″–6″. Height to 25′. Flowers March. Fruits May.

Spireas

(*Plate 60, p. 354*)

Spireas are shrubs with slender wandlike twigs, narrow-based and mostly toothed leaves, papery bark that often flakes off, and raised leaf scars with only 1 bundle scar. Leafstalks characteristically are short. Twig ends often wither in winter; some twigs may retain scales at their bases as in the honeysuckles (Plate 14) and some other opposite-leaved plants. Clusters of tiny dry 5-parted fruits often are present at twig tips following white or pink flowers.

On Plate 66 are several plants also with toothed leaves, 1 bundle scar, and small dry fruits. Sourwood and the sweetbells have raised leaf scars. Maleberry has smaller buds with more than

2 scales. Pepperbushes have true end buds smaller or lacking. The New Jersey teas (Plate 43) have only saucer-shaped remnants of fruit present in winter, and Sweet-spires (Plate 59) has 3 bundle scars and chambered pith.

Spirea buds are eaten by ruffed and sharptail grouse and twigs by rabbits and deer.

STEEPLEBUSH SPIREA *Spiraea tomentosa* L. **p. 354**

Recognition: No other spirea has *woolly* twigs and leaf undersides. Leaves coarse-toothed, egg-shaped to elliptic. Leaves 1″–3″. Height to 5′. Flowers pinkish, less commonly white, in slender pointed "steeples," June–Sept. Fruits Aug.–Dec.

NARROWLEAF SPIREA (MEADOWSWEET) **p. 354**
Spiraea alba Du Roi

Recognition: The only spirea with *narrow fine-toothed* leaves. Twigs sometimes somewhat yellow-hairy. Buds long-pointed and silky. Flower and fruit clusters long and slender. Leaves 2″–3″. Height to 4′. Flowers white, June–Sept.

BROADLEAF SPIREA (MEADOWSWEET) **p. 354**
Spiraea latifolia (Ait.) Borkh.

Recognition: Like Narrowleaf in the type of flowering structure, but with *wider, elliptic, coarse-toothed* leaves, hairless and reddish twigs, and short, hairless buds. Leaves 2″–3″. Height to 6′. Flowers white or pale pink, June–Sept.

DWARF SPIREA *Spiraea corymbosa* Raf. **p. 354**

Recognition: A low Appalachian species with wide, elliptic leaves, coarse-toothed *only above the middle*, purplish twigs, and short hairless buds. This spirea, like the next 2, has *flat-topped* flower and fruit clusters. Leaves 1″–3″. Height to 3′. Flowers white, June–July.

VIRGINIA SPIREA *Spiraea virginiana* Britt. **p. 354**

Recognition: The only *narrow-leaved* spirea with leaf margins bearing *a few coarse teeth or none*. Otherwise much like Dwarf Spirea. Leaves 1″–2″. Height to 5′.

JAPANESE SPIREA *Spiraea japonica* L. f. **Not illus.**

Recognition: Similar to Virginia Spirea but with *gray-hairy* twigs and long-pointed, narrow, *many toothed*, coarse-toothed leaves. Leaves 1″–3″. Height to 5′. Flowers pink to rose, July–Aug. Escaped from cultivation; New England and Indiana to Tennessee.

Hollies

(Plate 61, p. 356)

Hollies as a group are difficult to identify. No easily apparent characteristic occurs throughout. Nonevergreen species are particularly nondescript. When present, *minute* black stipules that flank the leaf scars are diagnostic. They are difficult to see, however, and may drop off with age. When shed, stipule scars marking their former location are very minute. Bundle scars, however, are single and true end buds are present. Furthermore, bud scales are paired, usually with 2, but sometimes with 4–6, apparent.

Hollies frequently develop short, stubby spur branches crowded with leaf scars or, in season, terminated by a whorl of leaves. Leaf blades of most hollies are toothed and wedge-shaped at the bottom. Buds commonly are more numerous near tips of the twigs; often they are clustered here. There may be more than 1 bud above each leaf scar. In general, holly bark is smooth. Male and female flowers may occur on different plants. The small nutlets in the fleshy red or dark fruits are smooth or grooved on the outside surface.

When in fruit, hollies most closely resemble Daphne and Mountain-holly (Plate 68), which also bear red fruits. The leaves of those plants, however, are not toothed.

AMERICAN HOLLY *Ilex opaca* Ait. **p. 356**

Recognition: One of the most universally recognized eastern trees. The *prickly evergreen* leaves are distinctive. Buds minute. Fruits *red* or, rarely, yellow; nutlets grooved. Leaves 2″–4″. Height 10′–40′ (100′); diameter 6″–24″ (48″). Flowers May–June. Fruits Aug.–June.

Remarks: This is the Christmas holly. The collection of foliage sprays has become a sizable business and, because of overharvesting, this decorative plant is less common than formerly in some areas. Holly lumber, peculiarly ivory-white, is in demand for special products such as piano keys, ship models, and inlays. Though reported to be somewhat toxic to some animals, the fruits are eaten by numerous songbirds, bobwhite, and wild turkey.

LOW GALLBERRY HOLLY *Ilex glabra* (L.) Gray **p. 356**

Recognition: An evergreen holly. Leaves usually blunt-tipped, *leathery, notched near tip,* toothless or with a few wavy-edged teeth above middle. Twigs finely gray-hairy; nutlets smooth. Leaves 1″–3″. Height to 10′. Flowers May–Aug. Fruits black, June–July.

Remarks: Though grown as a garden shrub in England, Low Gallberry Holly is little cultivated here. Leaves are reported to make a good tea. Fruits are food for many songbirds, bobwhite, and wild turkey. Another common name, Inkberry, may cause it to be confused with Pokeweed (*Phytolacca*), a nonwoody perennial also sometimes known by that name.

TALL GALLBERRY HOLLY **Leaf illus., p. 356**
Ilex coriacea (Pursh) Chapm.

Recognition: A southern evergreen shrub whose leaves somewhat resemble those of Low Gallberry Holly. They may have sharp teeth near the pointed tips or may lack teeth. Leaves often marked with fine black dots beneath. Twigs hairless or sticky; nutlets smooth. Leaves 2″–3″. Height to 15′; diameter 2″–3″. Flowers May. Fruits dark, Sept.–Oct. Swamps and sandy soils; Florida and Louisiana to se. Virginia.

YAUPON HOLLY *Ilex vomitoria* Ait. **Leaf illus., p. 356**

Recognition: A distinctive plant whose branches with red berries are often gathered for decorative purposes. Evergreen leaves small and wavy-edged; nutlets grooved. A strong medicinal "black drink" once brewed by Indians is believed to have been of Yaupon leaves. The caffeine-containing dried leaves reportedly make a desirable tea. Leaves ½″–2″. Height 5′–15′ (30′); diameter 2″–4″ (12″). Flowers May–June. Fruits red, Sept.–Oct. Sandy Coastal Plain; se. Virginia to centr. Florida, west to s. Texas, and north in Mississippi Valley to n. Arkansas and se. Oklahoma.

DECIDUOUS HOLLY *Ilex decidua* Walt. **p. 356**

Recognition: Shrubby or growing to small-tree size, this *nonevergreen* holly has variable narrow to egg-shaped leaves, generally thin but sometimes may be somewhat thickened. Leaf edges wavy- to blunt-toothed; twigs often stiff and buds somewhat pointed. Nutlets grooved. Leaves 2″–3″. Height 10′–20′ (30′); diameter 2″–6″ (10″). Flowers April–May. Fruits shiny red, Sept.–March.

Similar species: (1) Yaupon leaves are smaller and evergreen. (2) Juneberry Holly is rare and has fine-toothed leaves.

Remarks: Fruits eaten by several birds, including bobwhite. Sometimes called Possum-haw (see p. 198).

JUNEBERRY HOLLY **Not illus.**
Ilex amelanchier M. A. Curtis

Recognition: A rare low *nonevergreen* shrub of southern swamps with foliage resembling that of some juneberries (Plate 54). Leaves *fine-toothed*, somewhat oblong, leathery and veiny, and slightly hairy beneath. Nutlets grooved. Fruits dull red and on stalks ¼″–⅞″ long. Leaves 1″–2″. Height to 7′. See Deciduous Holly and Georgia Holly (p. 276). Local; Louisiana to Georgia and se. Virginia.

LARGELEAF HOLLY *Ilex montana* T. & G. **p. 356**

Recognition: A tall shrub or tree with *large* leaves for a holly. Leaves thin, narrow to elliptic, long-pointed, sharply *fine-toothed;* somewhat hairy beneath in var. *mollis* (Gray) Britt. Side twigs not especially stiff. Twigs green to reddish; buds somewhat *pointed;* nutlets grooved. Leaves 2½″–6″. Height 6′–20′ (40′); diameter 2″–10″ (12″). Flowers June. Fruits short-stalked (under ½″), red, Oct.–Nov.

Similar species: (1) Georgia Holly and (2) Common Winterberry Holly most closely resemble this species. Both are coarse-toothed, however, and have blunt buds. The former has long-stalked fruits and the latter less prolonged leaf tips and smooth nutlets. (3) Juneberry Holly is lower, with smaller leaves which are not long-pointed, and often has long-stalked fruits.

Remarks: An alternate name, Mountain Holly, should not be confused with the nontoothed Mountain-holly, *Nemopanthus* (Plate 68).

GEORGIA HOLLY *Ilex longipes* Chapm. **Not illus.**

Recognition: A large shrub with leaves similar to Largeleaf Holly but with fewer, coarser teeth. Leaf tips and bases both usually are sharp-pointed. Buds *blunt;* nutlets grooved. All other hollies except the fine-toothed Juneberry Holly have short-stalked fruits. Fruit stalks slender, *up to 1″ long.* Leaves ½″–4″. Height to 15′. Flowers May–June. Fruits red, rarely yellow, Oct. Streamsides and wooded slopes; N. Carolina, W. Virginia, and Tennessee to Florida and Louisiana.

COMMON WINTERBERRY HOLLY **p. 356**
Ilex verticillata (L.) Gray

Recognition: A variable small to large shrub whose leaves usually are wide but vary from narrow to nearly circular. Leaves *dull* above, with distinct coarse teeth; may be thin or thickish and somewhat hairy beneath or not. In some varieties, tiny transparent dots can be seen in leaves when a lens is used. Buds *blunt* with broadly pointed scales; nutlets *smooth.* Leaves 2″–4″. Height to 15′. Flowers June–Aug. Fruits red, rarely yellow, Sept.–Oct., or later.

Similar species: Dull upper leaf surfaces, shallow leaf teeth, and less pointed bud scales separate this species from the next. Largeleaf Holly has long-pointed leaves and grooved nutlets.

Remarks: Sometimes called Black Alder (see *Alnus,* Plate 51).

SMOOTH WINTERBERRY HOLLY **p. 356**
Ilex laevigata (Pursh) Gray

Recognition: Similar to but less variable than the preceding; foliage nevertheless may be narrow to elliptic. Leaves *shiny* above, hairless or nearly so beneath, and fine-toothed. Buds blunt but with *sharp-pointed* scales. Leaves ½″–4″. Height to 20′. Flowers May–July. Fruits red, rarely yellow, Sept.–Jan.

Blueberries

(*Plate 62, p. 358*)

Blueberries, huckleberries, bilberries, deerberries, and cranberries all are included in the genus *Vaccinium*, a large and complex series of acid-soil plants of the heath family. They often resemble one another closely and many hybridize. Small specimens in particular are frequently difficult to identify. Winter identification characteristics are not always available. Cranberries are shown on Plate 32; other vacciniums on Plates 62 and 63.

Blueberries have small, mostly elliptic, short-stalked leaves. Twigs are slender, green or reddish, and often zigzag, covered with very numerous raised, granular speckles, or warts, usually visible to the eye but better seen under a lens. Two types of buds are commonly present: slim leaf buds and swollen flower buds, though both are small. The tiny bud scales frequently have long tapered tips. The end buds are false. There is 1 bundle scar per leaf scar. The small, whitish, bell-like blossoms are very ornamental. The blue or black fruits of blueberries contain many small seeds, in contrast to the huckleberries, which regularly have 10 nutlets per fruit. All have edible fruits; some are very tasty.

VELVETLEAF BLUEBERRY p. 358

Vaccinium myrtilloides Michx.

Recognition: The only low blueberry with leaves that are *not toothed* and are *velvety* and whitened beneath and often hairy also above. Twigs densely velvety-hairy. Leaves 1″–2″, mostly less than 1⅝″ long and ¾″ wide. Height to nearly 3′. Flowers May–June. Fruits blue with white powder (rarely white), sour, July–Sept.

Similar species: Black Highbush Blueberry has similar foliage and twigs but leaves usually longer and wider, fruits black, and full-size plants taller; it is more southern.

Remarks: Fruits eaten by sharptail and ruffed grouse.

BLACK HIGHBUSH BLUEBERRY p. 358

Vaccinium atrococcum (Gray) Heller

Recognition: *The only tall woolly-leaved blueberry.* Leaves not toothed; twigs hairy. Leaves 1⅝″–3¼″. Height to 12′. Flowers as leaves come out, May–June. Fruits black without whitish powder, rarely white, sweet, June–Aug.

Similar species: Velvetleaf Blueberry is much lower, with smaller leaves and blue fruits.

COASTAL HIGHBUSH BLUEBERRY **Not illus.**
Vaccinium caesariense Mackenz.

Recognition: Like Black Highbush in lacking leaf teeth, but somewhat lower and with *smaller hairless* leaves that are always *whitened* beneath. Twig speckles less numerous. A variety of Common Highbush Blueberry has whitened leaf undersides but has toothed leaves. Leaves 1″–2″ (3″). Height to 10′. Flowers May. Fruits dark blue with white powder. Mostly Coastal Plain; s. Maine and centr. New York to Florida.

COMMON HIGHBUSH BLUEBERRY **p. 358**
Vaccinium corymbosum L.

Recognition: A tall shrub. Leaves elliptic, slightly hairy or hairless, usually without teeth, and *green* beneath, but one variety, *albiflorum* (Hook.) Fern., has very fine teeth and green leaf undersides; another (var. *glabrum* Gray) has larger bristle-teeth and whitened lower leaf surfaces. Leaves 1⅝″–3¼″. Height to 12′. Flowers after leaves expand, May–June. Fruits blue to blue-black with whitish powder, sweet, June–Sept.

Similar species: (1) Coastal Highbush and (2) Elliott Blueberries have smaller leaves. The former has leaf undersides whitened and the latter has them shiny.

Remarks: This species is the basic stock of many cultivated varieties. Fruits taken by mourning dove, ruffed grouse, pheasant, and many songbirds.

ELLIOTT BLUEBERRY **Not illus.**
Vaccinium elliottii Chapm.

Recognition: A tall southern shrub. Leaves small, either wavy-edged or fine-toothed, *shiny green on both surfaces.* Twigs hairless or slightly hairy. Leaves ½″–1½″. Height to 12′. Flowers March–May. Fruits long-stemmed, black, dry, June–July. Thickets; Florida and Louisiana n. to se. Virginia and Arkansas.

EARLY LOW BLUEBERRY **p. 358**
Vaccinium vacillans Torr.

Recognition: A low hairless shrub. Egg-shaped to elliptic leaves may have a few bristle-tipped teeth or teeth may be lacking. Foliage *dull above, whitish beneath;* may become somewhat leathery with age. Leaves ⅝″–2″ long and ⅝″–1⅜″ wide. Height to 3′. Flowers April–June. Fruits dark blue with white powder (or, toward the West, black and powderless), sweet, June–Sept.

Similar species: (1) Late Low Blueberry has narrower, thinner leaves with full sets of teeth. (2) Elliott and (3) Slender

Blueberries have leaves shiny above and fruits black. It may be difficult to separate small highbush blueberries without teeth from Early Low Blueberry.
Remarks: Fruits eaten by wild turkey, ruffed grouse, and gray fox. Whitetail deer and cottontail browse twigs.

SLENDER BLUEBERRY *Vaccinium tenellum* Ait. **Not illus.**
Recognition: A clumped low southern shrub. Leaves small and somewhat wedge-shaped, with a few teeth or none, shiny above; undersides usually somewhat hairy, with scattered red glandular hairs. Branches very few. Leaves ½″–1¼″. Height to 1½′. Flowers April–May. Fruits black, dryish, June–July. Mostly sandy soils; se. Virginia and Tennessee to Florida and Mississippi.

LATE LOW BLUEBERRY **p. 358**
Vaccinium angustifolium Ait.
Recognition: A low, much branched shrub that forms clumps, spreading by underground stems. Leaves mostly *narrow* and always *finely toothed*, each tooth bristle-tipped; dull above and green on both sides, though lighter beneath. Foliage and twigs may be somewhat hairy or not. Leaves ¼″–1⅜″ long and ⅛″–⅝″ wide. Height to 2′. Flowers April–June. Fruits blue with white powder—black without powder in var. *nigrum* (Wood) Dole—sweet, over ¼″, Aug.–Sept.
Similar species: (1) Southern Low Blueberry has larger leaves; (2) Slender Blueberry has shiny foliage. (3) Early Low Blueberry has wider leaves.
Remarks: Fruits eaten by bobwhite, prairie chicken, and ruffed grouse.

SOUTHERN LOW BLUEBERRY **p. 358**
Vaccinium pallidum Ait.
Recognition: Similar to preceding but leaves *larger;* berries mostly smaller, dry to the taste. Leaves hairless, except often for leafstalk. Twigs hairless or hairy in lines. Leaves 1¼″–2″ long and ⅝″–1″ broad. Height to 2′. Fruits blue, under 5⁄16″.

Huckleberries, Bilberries, and Relatives

(*Plate 63, p. 360*)

These plants are similar to the closely related blueberries in lacking true end buds and in having small, short-stalked leaves that are mostly elliptic. Also, the twigs are slender, often green or red, and the flowers are small and mostly whitish. The fruits (10 to many seeds) are small blue to black berries (red in 1 species), generally in lengthened clusters, and usually edible. None of these species, however, have twigs densely covered with fine warty speckles as in the true blueberries (p. 277).

DWARF HUCKLEBERRY **p. 360**
Gaylussacia dumosa (Andr.) T. & G.

Recognition: A low shrub. Leaves wedge-shaped at base, rounded and bristle-tipped on outer portion, *not toothed,* shiny above, somewhat hairy, covered with yellow resin-dots *beneath and often above* (use lens), somewhat leathery, though not evergreen. Flower buds larger than leaf buds. The latter have *4–5 scales.* Twigs usually *hairy.* Leaves 1″–2″. Height to 20″. Flowers clustered, white or pink, May–June. Fruits black, hairy, June–Oct.

Similar species: Of this group, Dwarf, (1) Tall, and (2) Black Huckleberries have resin-dotted foliage (Box Huckleberry, though related, does not); Tall Huckleberry is taller, with whitish-hairy leaf undersides; Dwarf Bilberry has toothed, undotted leaves.

TALL HUCKLEBERRY **Not illus.**
Gaylussacia frondosa (L.) T. & G.

Recognition: Somewhat like the last but leaves more egg-shaped, quite *whitish-hairy* and veiny beneath and with resin-dots *only beneath.* Twigs mostly hairy; leaf buds have 4–5 scales. Known also as Dangleberry. Height to 6′. Fruits dark blue with white powder, June–Sept. Upland woods; Massachusetts and s. New Hampshire to Florida and Louisiana.

BLACK HUCKLEBERRY **p. 360**
Gaylussacia baccata (Wang.) K. Koch

Recognition: A shrub with leaves egg-shaped or elliptic, dull above, not toothed and covered on *both surfaces* with yellow *resin-dots.* Leaf undersides often yellowish. Twigs hairy. Buds of 2 types; leaf buds smaller, with *2–3 scales.* Leaves 1″–3″. Height to 3′. Flowers clustered, greenish white or greenish red, May–June. Fruits black, less commonly blue or even whitish, July–Sept.

Similar species: (1) Tall Huckleberry has resin-dots only on leaf undersides and it and (2) Dwarf Huckleberry have 4–5 bud scales. In winter, deerberries have buds all of 1 size.

Remarks: The most widespread and frequently the most common huckleberry. Ruffed and sharptail grouse, prairie chicken, bobwhite, wild turkey, and mourning dove eat fruits. Jellies, marmalades, and desserts can be made from fruits.

TALL DEERBERRY *Vaccinium stamineum* L. **p. 360**

Recognition: A tall shrub with variable foliage, mostly egg-shaped to elliptic. Leaves thin, *not toothed,* typically whitish and hairy *beneath.* Two southern varieties, *interius* (Ashe)

Palmer & Steyerm. and *neglectum* (Small) Deam, have hairless foliage. Twigs hairy. Buds of *1 type,* long-pointed, 2–3 scales. Leaves 1″–4″. Height to 10′. Flowers May–June. Fruits greenish to purple, sometimes white-powdered, July–Sept.

Similar species: (1) Tall, (2) Dwarf, and (3) Black Huckleberries have resin-dotted foliage. Bilberries have either toothed or leathery leaves except for (4) Tundra and (5) Ovalleaf Bilberries, which are more northern; Tundra Bilberry is lower and Ovalleaf has angled twigs. (6) See Low Deerberry.

Remarks: Stewed and sweetened fruits are said to be good when served cold. Ruffed grouse, bobwhite, and gray fox eat wild fruits.

LOW DEERBERRY *Vaccinium caesium* Greene **Not illus.**

Recognition: Similar to Tall Deerberry but lower. Leaves thin, mostly under 2″, *blunt-tipped,* whitened or green beneath. Twigs may or may not be hairy. Height to 20″ (rarely 3′). Dry soils; mountains of w. Pennsylvania and W. Virginia to Florida and Louisiana.

TUNDRA BILBERRY *Vaccinium uliginosum* L. **p. 360**

Recognition: A somewhat leaning or upright low shrub. Leaves small, usually hairless, more or less elliptic, *smooth-edged,* somewhat pale beneath. Older branchlets have shreddy bark. Leaves 3⁄16″–1″. Height to 2′. Flowers June–July. Fruits blue to black, sweet, July–Sept.

Similar species: (1) Box Huckleberry has wavy-toothed leaves and occurs only in southern areas. (2) Labrador Tea, (3) Leatherleaf, and (4) Bog Rosemary (Plate 65) have distinctive leaf undersides. (5) Dwarf Bilberry has toothed, wedge-shaped leaves.

Remarks: Spruce grouse and ptarmigan feed on fruits.

OVALLEAF BILBERRY *Vaccinium ovalifolium* Sm. **Not illus.**

Recognition: Like the preceding 2 species in having leaves *not toothed* but otherwise resembles the Square-twig Bilberry. Leaves sometimes slightly wavy-edged. Leaves 1″–2″. Height to 5′. Flowers June. Fruits blue with white powder. Thickets; Newfoundland and se. Labrador to w. Ontario and n. Michigan; Alaska to Idaho and Oregon.

SQUARE-TWIG BILBERRY **p. 360**
Vaccinium membranaceum Dougl.

Recognition: A low to medium-sized shrub with *4-angled* or 4-lined twigs and peeling older bark. Leaves elliptic and always *toothed.* Leaves 1″–3″. Height to 4½′. Flowers June–July. Fruits purple or black, sometimes with slight bloom, Aug.–Sept.

Similar species: (1) Ovalleaf Bilberry has leaves not toothed. (2) Box Huckleberry has leathery foliage. (3) Newfoundland Bilberry has twigs not angled.

NEWFOUNDLAND BILBERRY **Not illus.**
Vaccinium nubigenum Fern.

Recognition: Much like Square-twig Bilberry but twigs *not angled* and leaves smaller. Leaves hairless, ½″–1⅜″. Fruits blue-black with white powder, sweet, Aug.–Sept. Rocky and acid soils; n. Newfoundland and e. Quebec mountains.

DWARF BILBERRY *Vaccinium cespitosum* Michx. **p. 360**

Recognition: A very low clumped shrub. Leaves shiny, *toothed, wedge-shaped,* less commonly egg-shaped. Leaves ½″–1⅝″. Height to 1′. Flowers June–July. Fruits light blue with whitish powder, July–Aug.

Similar species: (1) Tundra Bilberry has leaves not toothed and not regularly wedge-shaped. (2) Box Huckleberry is more southern and has wavy-toothed leaf edges. Dwarf Huckleberry has resin-dotted foliage.

SOUTHERN MOUNTAIN-CRANBERRY **Not illus.**
Vaccinium erythrocarpum Michx.

Recognition: Though the true cranberries and Northern Mountain-cranberry (Plate 32) creep or run prostrate, this southern species is *upright* and often rather tall. Leaves more or less egg-shaped but *long-pointed.* Leaf edges *bristle-toothed.* Twigs and leaf undersides slightly hairy. Leaves 1″–3″. Height to 8′. Flowers May–June. Fruits *red,* tasteless, single, June–Aug. Mountain forests; W. Virginia and w. Virginia to Georgia and Tennessee.

BOX HUCKLEBERRY **p. 360**
Gaylussacia brachycera (Michx.) Gray

Recognition: A southern low shrub with *thick leathery evergreen* foliage. Branches from creeping underground stems. Leaves 1″ long or less, oval, green beneath, more or less finely round-toothed. Twigs *sharply angled.* Leaves ¼″–1″. Height to 15″. Flowers May–June. Fruits July–Aug.

Similar species: (1) Tundra and (2) Dwarf Bilberries are more northern. (3) Labrador Tea, (4) Leatherleaf, and (5) Bog Rosemary (Plate 65) all lack green leaf undersides. (6) See Farkleberry. Bilberries with angled twigs have thin leaves.

Remarks: Ruffed grouse eats fruits.

FARKLEBERRY *Vaccinium arboreum* Marsh. **p. 360**

Recognition: Largely southern; the only *Vaccinium* occasionally to grow to tree size. A large shrub or small tree. Leaves egg-shaped, *thick, and leathery,* toothed or not. Evergreen in

South. Leaves 1″–2″. Height to 30′; diameter to 6″. Flowers July–Aug. Fruits black, dry, Aug.–Oct.

Similar species: Thick leathery leaves and large size are rather distinctive. Mountain Laurel (Plate 65) has dry fruits and longer leaves clustered at twig tips.

Remarks: Fruits are eaten by bobwhite and numerous songbirds.

Azaleas

(*Plate 64, p. 362*)

Azaleas are small to large shrubs whose leaves and buds are clustered near the twig tips. Furthermore, the twigs also are clustered and typically radiate out from the ends of the older branchlets. The true end buds usually are flower buds much larger than the lateral leaf buds. Azaleas are the only nonevergreen species with 1 bundle scar which have large end buds and clustered leaves, buds, and twigs. The leaves are not toothed (except see Toothed Azalea) but have hairy edges, seen under magnification. The flowers fundamentally are vaselike, with long stamens protruding from the mouth of the tubular basal portion. Some often are improperly called wild honeysuckle or bush-honeysuckle. Fruits are dry, brown, slender vaselike capsules, often present in winter.

The azaleas, which are deciduous, and the evergreen rhododendrons (Plates 32, 65) constitute the genus *Rhododendron* in our area. Other species found elsewhere in the world connect these 2 sections of the genus within the heath family. Azaleas do not occur in the northwestern portion of our area. Alpine-azalea (Plate 12) is neither similar nor closely related but Rhododendron Rosebay (Plate 32) is a matted evergreen.

Like the evergreen rhododendrons, the shrubby azaleas are highly prized for their beautiful clusters of large and colorful blossoms. Many native species, as well as Asiatic and hybrid forms, are commonly planted in gardens. In the wild they are often locally rare because of picking.

SMOOTH AZALEA **p. 362**
Rhododendron arborescens (Pursh) Torr.

Recognition: A shrub of eastern mountains. Unlike all other native azaleas, both the leaf undersides (even midribs) and twigs *lack hairs.* Leaves elliptic, relatively wider than those of other azaleas. Leaves 1″–3″. Height to 20′. Flowers pink, sometimes white, appearing after the leaves, June–July.

PINKSHELL AZALEA *Rhododendron vaseyi* Gray **Not illus.**

Recognition: In Massachusetts this cultivated azalea is reported to have escaped. The pointed leaves are hairless and the flowers, which appear before the leaves, are rose-colored.

RHODORA AZALEA **p. 362**

Rhododendron canadense (L.) Torr.

Recognition: A low shrub with *blunt-tipped* somewhat hairy leaves and hairless twigs. Buds *hairy;* large flower buds have only a few scales, which drop early. Unlike other azaleas, flowers have a very short tube. Leaves ½″–2½″. Height to 3′. Flowers purplish, rarely white, usually appearing *before leaves,* March–July.

Similar species: The flower type, blunt leaves, and combination of hairy buds, hairless twigs, and few-scaled flower buds set this species aside from our other azaleas. See next species.

JAPANESE AZALEA **Not illus.**

Rhododendron japonicum (Gray) Suringar

Recognition: The only other regularly *blunt-leaved* azalea is Rhodora, but leaves of Japanese Azalea are *hairless.* Some leaves of other species may be blunt-tipped, but usually most are of the typical pointed type. Escaped from cultivation; Connecticut and n. New Jersey.

EARLY AZALEA **p. 362**

Rhododendron roseum (Loisel.) Rehd.

Recognition: A northern shrub with narrow (as illustrated) to wide leaves that are *woolly beneath.* Both twigs and buds woolly. Leaves 1″–4½″. Height to 10′. Flowers white or pink, appearing before or with leaves, May–June. Flower tube only *about as long* as petal lobes.

Similar species: Separable from (1) Woolly Azalea mostly by more northern upland range and shorter flower tubes; from (2) Flame Azalea by hairy buds and less colorful blossoms.

WOOLLY AZALEA **Not illus.**

Rhododendron canescens (Michx.) Sweet

Recognition: Very similar to Early Azalea but leaves typically narrow. Most certain identification is by flower-tube length, which is *twice as long* as petal lobes. Swamps and woods; Florida and e. Texas, north to e. Delaware and ne. Maryland and to s. Illinois and s. Ohio.

FLAME AZALEA **p. 362**

Rhododendron calendulaceum (Michx.) Torr.

Recognition: A sometimes tall shrub with beautiful *orange or scarlet* blossoms. Leaves narrow to wide; woolly, with short hairs beneath. Twigs densely hairy or sparsely long-hairy but buds hairless. Leaves 1″–3″. Height to 17′. Flowers appear before or with leaves, May–June.

Similar species: (1) Early Azalea has hairy buds and white or pink flowers. (2) Cumberland Azalea has hairless twigs.

CUMBERLAND AZALEA **Not illus.**
Rhododendron cumberlandense E. L. Br.

Recognition: Similar to Flame Azalea in color of blossoms but these do not appear until after leaves have matured. Furthermore, twigs are hairless and flower-bud scales are bristle-tipped. Flowers June–July. Oak forests; Kentucky and W. Virginia.

SWAMP AZALEA *Rhododendron viscosum* (L.) Torr. **p. 362**

Recognition: A medium-sized to tall shrub with leaves *glossy* above and green to white beneath; midrib beneath bristly-hairy. Twigs sometimes densely bristly-hairy; buds also somewhat hairy. Winter flower buds have 8–12 scales that are rounded or have short bristle-tips. Leaves ⅝″–2½″. Height to 17′. Flowers white, rarely pink-striped or reddish, appearing after leaves have grown, June–Sept.

Similar species: Four azaleas have leaves of this shape and hairiness. This species differs from (1) Toothed Azalea in having fewer flower-bud scales, toothless leaves, and northern range; from (2) Pink Azalea in whiter blossoms, which appear after leaves, glossy leaf uppersides, and usually more hairy buds. (3) Dwarf Azalea has a lower, clumped form and Coastal Plain habitat.

TOOTHED AZALEA **Not illus.**
Rhododendron serrulatum (Small) Millais

Recognition: A southern plant; resembles Swamp Azalea but leaves larger, *very finely toothed*, and always green on both sides. Winter flower buds have 15–20 bristle-tipped dark-bordered scales. Leaves 1″–3¼″. Height to 22′. Flowers white, appearing after leaves, June–July. Low woods; Mississippi to Florida and north to se. Virginia.

PINK AZALEA *Rhododendron nudiflorum* (L.) Torr. **p. 362**

Recognition: Much like Swamp Azalea but leaves *dull* above and green beneath. Twigs bristly-hairy; buds usually nearly *hairless* but may be somewhat hairy. Leaves 1″–3¼″. Height to 10′. Flowers pink, rarely white or purplish, appearing before or with leaves, March–May.

Remarks: Succulent green leaf galls, though abnormalities, frequently occur. These are edible raw or, reportedly, pickled.

DWARF AZALEA **Not illus.**
Rhododendron atlanticum (Ashe) Rehd.

Recognition: A low Coastal Plain shrub growing in *dense colonies* and spreading by underground runners. Leaves wedge-shaped

SWEETLEAF *Symplocos tinctoria* (L.) L'Hér. **p. 368**
Recognition: A large shrub or small tree of the Coastal Plain. Leaves narrow to egg-shaped, usually at least partially toothed and semileathery, often remaining until spring; *sweet* to the taste. Buds dark with several scales. Pith *chambered.* Bark grayish-smooth, often with shallow vertical cracks. Leaves 3″–7″. Height to 40′; diameter to 10″. A pine-woods variety in se. Virginia grows only to 4′ or less. Flowers white, April–May. Fruits fleshy, reddish, single-seeded, about ⅜″, Aug.–Sept.
Similar species: Only 3 species with single bundle scars have chambered piths. (1) Silverbell-tree has reddish buds, and (2) the buds of Persimmon (Plate 68) are dark, with only 2 scales.

SILVERBELL-TREE *Halesia carolina* L. **p. 368**
Recognition: A shrub or small tree with somewhat white-striped bark. Leaves toothed, egg-shaped, somewhat hairy beneath. Twigs hairless to hairy. Buds *reddish;* pith *chambered.* Leaves 2″–7″. Height 10′–20′ (90′); diameter 6″–12″ (3′). Flowers *showy, white 4-petaled,* May. Fruits dry, *4-winged,* 1″–1¾″.
Similar species: See Sweetleaf.

AMERICAN SNOWBELL *Styrax americana* Lam. **p. 368**
Recognition: A shrub with elliptic leaves usually nearly hairless; few teeth or none. (Var. *pulverulenta* (Michx.) Perkins with leaves sometimes egg-shaped and hairy or scaly beneath occurs north to s. Virginia and Arkansas.) Twigs hairless or nearly so. Buds have *no scales,* blunt and brown-hairy, often one above another; end buds false. Single bundle scar, sometimes somewhat broken. Leaves 1″–4″. Height to 14′. Flowers white, showy, in 1″–2″ elongate clusters, May. Fruits dry, 1-seeded, Sept.–Oct.
Similar species: Snowbells are our only species with naked buds and single bundle scars. Bigleaf Snowbell has wider-based, more hairy leaves and very hairy or scaly twigs.

BIGLEAF SNOWBELL *Styrax grandifolia* Ait. **p. 368**
Recognition: Similar to American Snowbell but with egg-shaped leaves *white-hairy* beneath. Twigs very hairy or scaly. Leaves 2″–8″. Height to 12′ (40′). Flowers in 2″–6″ clusters.

SILKY-CAMELLIA *Stewartia malachodendron* L. **p. 368**
Recognition: A shrub with elliptic toothed leaves, soft-hairy beneath. Buds slender, under ⅛″, often slightly hairy. Twigs may be fine-hairy. Leaves 2″–4″. Height to 15′. Flowers white,

tough bark. It has circular leaf scars and more than 3 bundle scars.

MOUNTAIN-HOLLY **p. 370**
Nemopanthus mucronata (L.) Trel.

Recognition: A shrub with rather small leaves. Leaves more or less elliptic but often with parallel sides, typically *bristle-tipped;* rarely with some small teeth. Buds have 2–3 exposed scales; somewhat long-pointed; end buds true. Older branches gray. Though related to hollies (Plate 61), stipules absent. Leaves 1″–2½″. Height to 10′. Flowers yellowish, small, single or clustered, May–June. Fruits dull red, rarely yellow, several-seeded, Aug.–Sept.

Similar species: Oblong, bristle-tipped leaves and long-pointed buds separate this from other 1-bundle-scar shrubs with toothless foliage.

STAGGERBUSH *Lyonia mariana* (L.) D. Don **p. 370**

Recognition: A slender shrub. Leaves rather nondescript, egg-shaped to elliptic, hairless or hairy only on veins beneath. Buds have *4–5 visible scales;* ball-shaped to short cone-shaped. End buds false. Twigs grayish. Leaves 1″–3″. Height to 7′. Flowers white to pink, bell-shaped, in open clusters on older branches, May–June. Fruits dry, urn-shaped, 5-parted capsules.

Similar species: Other nonevergreen shrubs with 1 bundle scar and untoothed leaves have hairy twigs, diaphragmed pith, or other distinctive characteristics. Leaf shape and dry fruits of Staggerbush are shared with next 2 species, but (1) Zenobia has only 2–3 bud scales and reddish twigs and (2) Minniebush has large true end buds present.

Remarks: Foliage may be poisonous to lambs and calves.

ZENOBIA *Zenobia pulverulenta* (Bartr.) Pollard **Not illus.**

Recognition: A shrubby heath with *leathery,* wavy-edged leaves and *white-powdered* hairless foliage and twigs. Twigs reddish to brown. Buds have 2–3 visible scales but otherwise much like those of last species. Leaves 1″–3″. Height to 10′. Flowers white, in short clusters, June. Fruits dry, ball-shaped, 5-parted capsules. Pine woods; se. Virginia, e. N. Carolina, and ne. S. Carolina.

MINNIEBUSH *Menziesia pilosa* (Michx.) Juss. **p. 370**

Recognition: A low Appalachian shrub. Leaves elliptic, hairy above; *obvious glands* along midrib beneath. Foliage clustered near twig tips. Side buds 2- to 3-scaled, egg-shaped; end buds true and usually much larger. Twigs somewhat bristly-hairy, older bark shreddy. Leaves 1″–2″. Height to 6′. Flowers white

to purplish, small, bell-shaped, May-June. Fruits dry 4-parted capsules.
Similar species: No other shrub with 1 bundle scar has such leaf glands on leaf undersides, though (1) American Silverberry has brown scales on midrib. In winter, large true end buds also occur among 1-bundle-scar plants only in azaleas (Plate 64) and pepperbushes (Plate 66); azaleas have tighter bark and pepperbushes have hairy outer end bud scales. (2) See also Staggerbush.

WHIN *Genista tinctoria* L. **Not illus.**
Recognition: A low weak shrub with narrow stalkless leaves and twigs that are finely grooved lengthwise (see Chinese Matrimony-vine, p. 190). Leaf scars small; bundle scars single, though often indistinct. Leaves ½″–1″. Flowers yellow, June–July. Fruits flat several-seeded pods. A European importation; poor soils, s. Maine, Massachusetts, and Michigan to District of Columbia.

ANDRACHNE **Not illus.**
Andrachne phyllanthoides (Nutt.) Muell. Arg.
Recognition: Low shrub with leaves small, elliptic, nearly stalkless, and finely bristle-tipped. Twigs somewhat 5-angled, 5-lined, often slightly hairy. Branchlets shiny. Bud scales 3–4; edges hairy. Leaves under 1″. Height to 3′. Flowers small, May–Oct. Fruits dry capsules. Dry soils, s. Missouri to Texas.

PONDSPICE *Litsea aestivalis* (L.) Fern. **p. 370**
Recognition: A rare southern shrub much like the related spicebushes (Plate 59). Leaves rather narrow, hairless, and leathery. Crushed leaves and twigs *aromatic.* Buds conical; leaf scars somewhat raised. Leaves 1″–3″. Height to 9′. Flowers yellow, small, March–April. Fruits single-seeded.

OILNUT *Pyrularia pubera* Michx. **p. 370**
Recognition: A *parasitic* Appalachian shrub growing on roots of various trees and shrubs. Leaves thin, broadly elliptic, often soft and hairy, with tiny *transparent dots* visible when held up to light. Twigs fine-hairy; buds large and greenish. Leaves 2″–6″. Height to 13′. Flowers in end clusters, May–June. Fruits pear-shaped, inch-long, Sept.

REDBAY *Persea borbonia* (L.) Spreng. **p. 370**
Recognition: A Coastal Plain tree. Leaves narrow, *shiny, leathery, evergreen,* pale beneath. Twigs angled. Bark dark *reddish, deeply grooved.* Leaves 3″–6″. Height to 50′ or 70′; diameter to 3′. Flowers May–July. Fruits blue or black, single-seeded, in red-stemmed clusters, Aug.–Sept.

TITI *Cyrilla racemiflora* L. **p. 370**
Recognition: A southern shrub. Leaves *shiny, blunt-tipped, evergreen, and leathery,* but thin in var. *subglobosa* Fern. (se. Virginia). Leaves 2″–4″. Height to 20′ (to 35′ in South). Flowers white, in long end clusters, June–July. Fruits yellow, Aug.–Sept.

GREENBRIERS

Green-stemmed, often evergreen, mostly thorny, vines climbing by tendrils attached to the persistent bases of the leafstalks.

ʃ LAUREL GREENBRIER, *Smilax laurifolia* p. 182
Swamps and bottomlands; New Jersey and Tennessee to Florida and Texas.

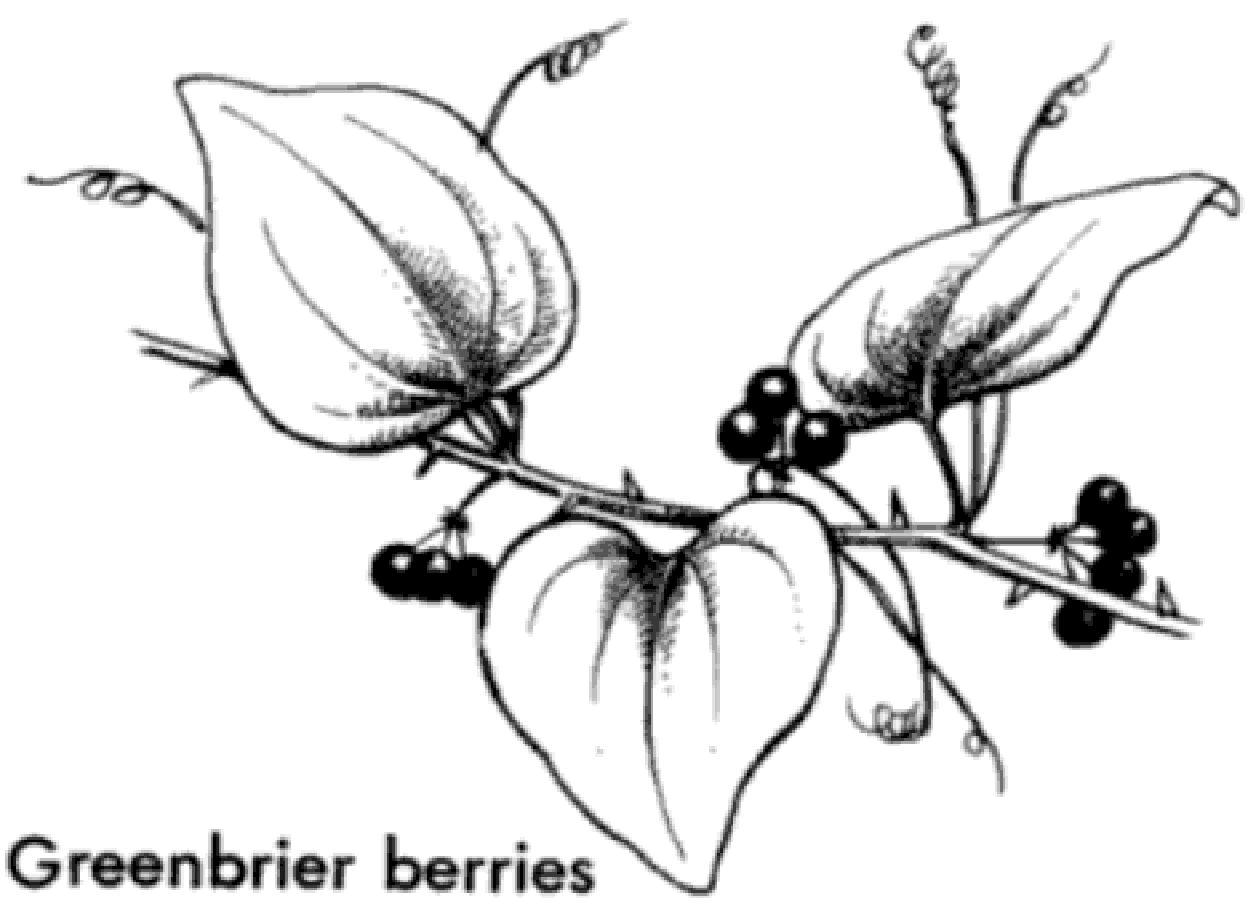
ʃ REDBERRY GREENBRIER, *Smilax walteri* p. 182
Sandy and boggy places; Coastal Plain from Louisiana and Florida to New Jersey.

ʃ BRISTLY GREENBRIER p. 182
Smilax tamnoides var. *hispida*
Fertile soils; New York, s. Ontario and S. Dakota to Florida and Texas.
ʃ HELLFETTER GREENBRIER p. 182
S. tamnoides (not illus.)

ʃ GLAUCOUS GREENBRIER, *Smilax glauca* p. 183
Woods and thickets; s. New England, se. New York, e. Pennsylvania, W. Virginia, s. Ohio, s. Illinois, and se. Missouri to Florida and Texas.

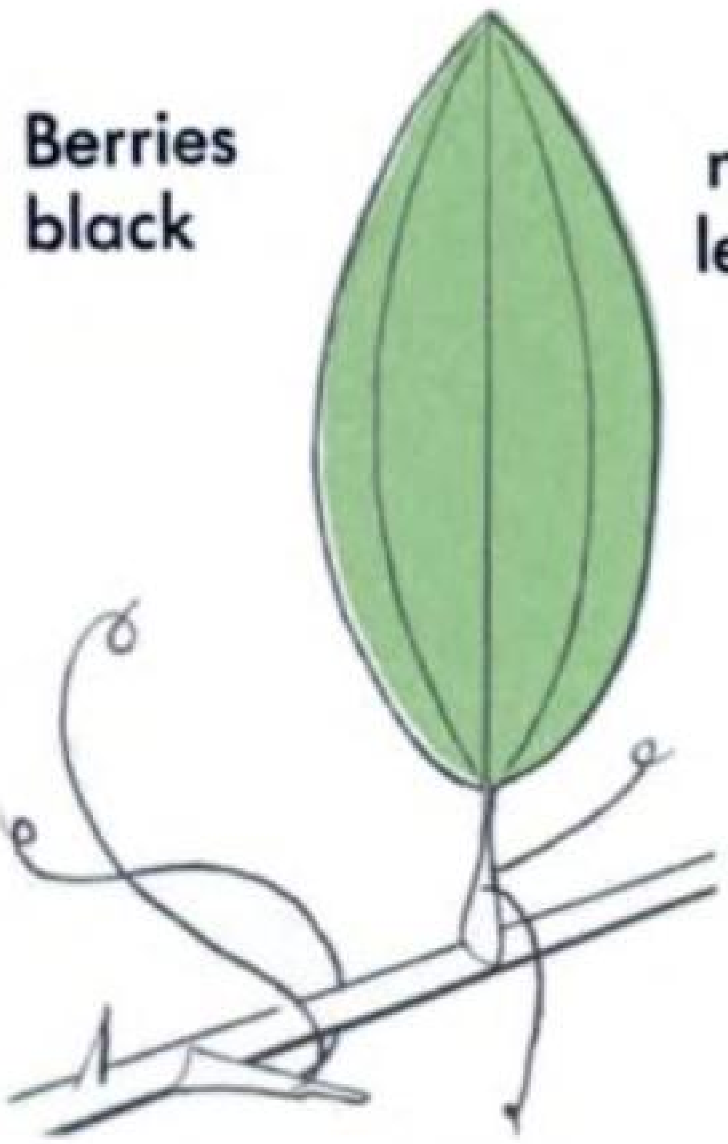
ʃ BULLBRIER GREENBRIER, *Smilax bona-nox* p. 183
Woods and thickets; se. Massachusetts, Delaware, Maryland, Kentucky, se. Indiana, s. Illinois, Missouri, and Kansas to Florida and Texas.

ʃ COMMON GREENBRIER, *Smilax rotundifolia* p. 183
Woods and thickets; Nova Scotia, s. Maine, s. New Hampshire, New York, s. Ontario, s. Michigan, Illinois, se. Missouri, and Oklahoma to Florida and Texas.



Typical Greenbrier berries

Berries black



LAUREL

Leaves green beneath

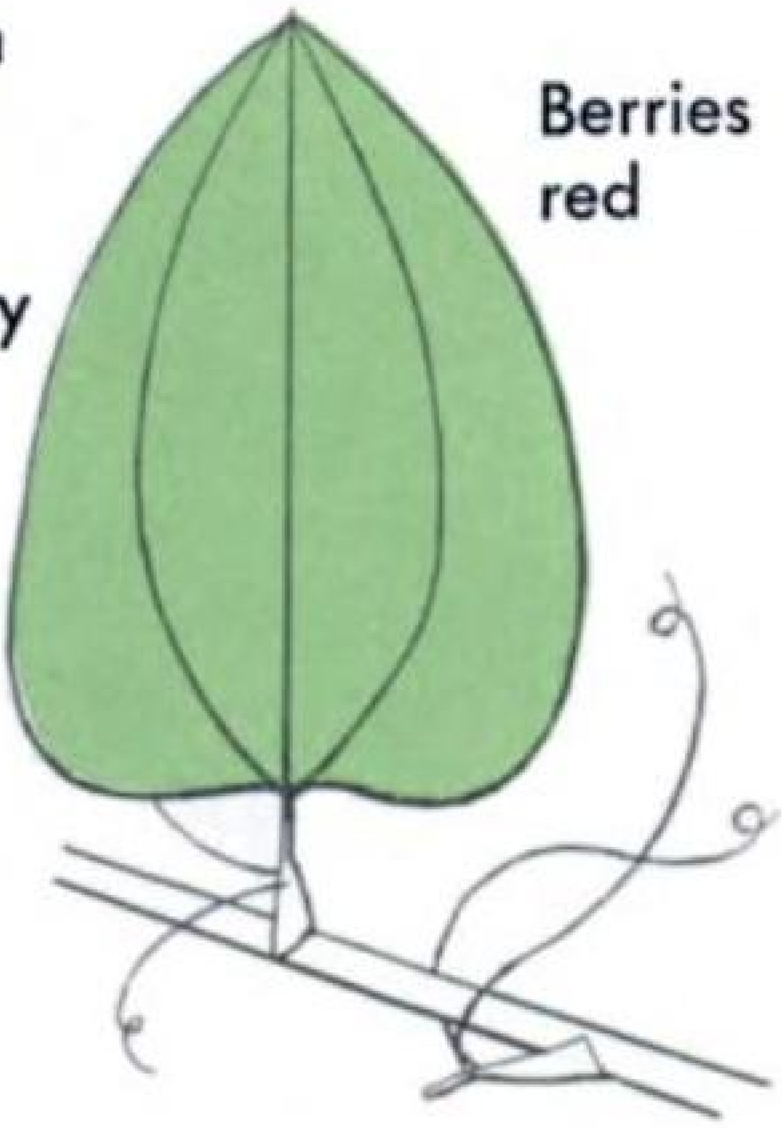
narrow, leathery

broad, not leathery

Stems round

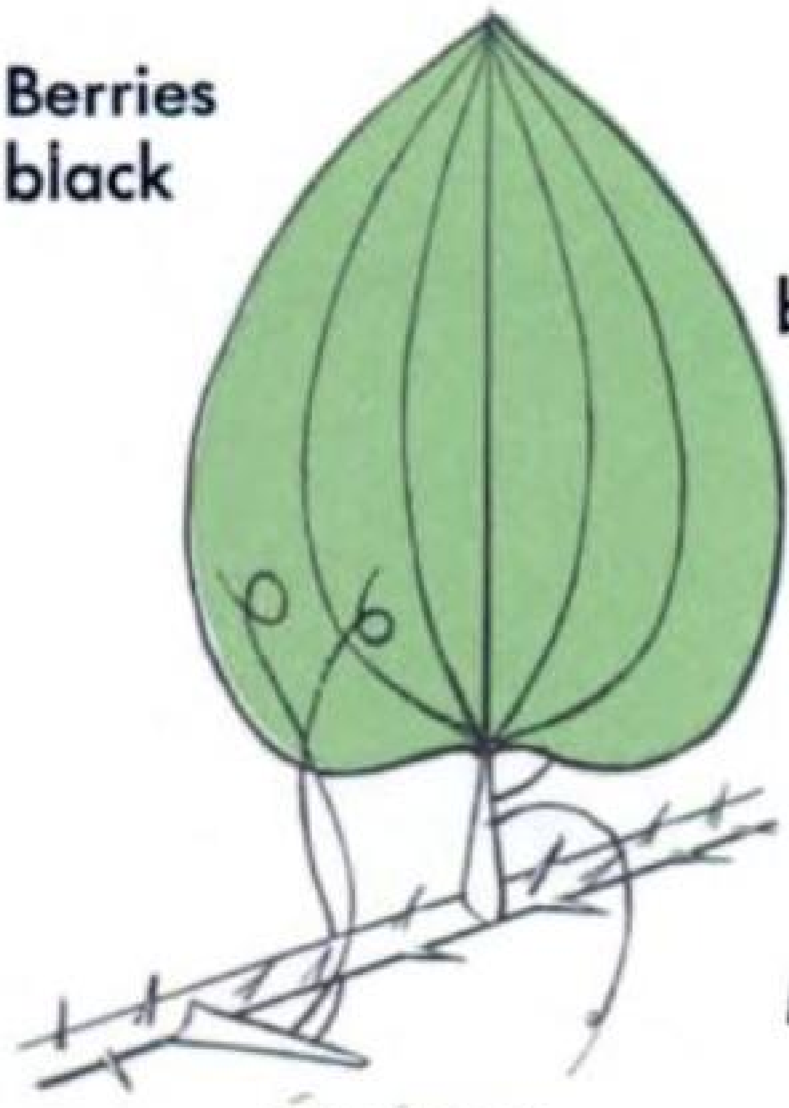
Thorns absent, or present mainly on lower portions

Berries red



REDBERRY

Berries black



BRISTLY

Leaves broad, not leathery

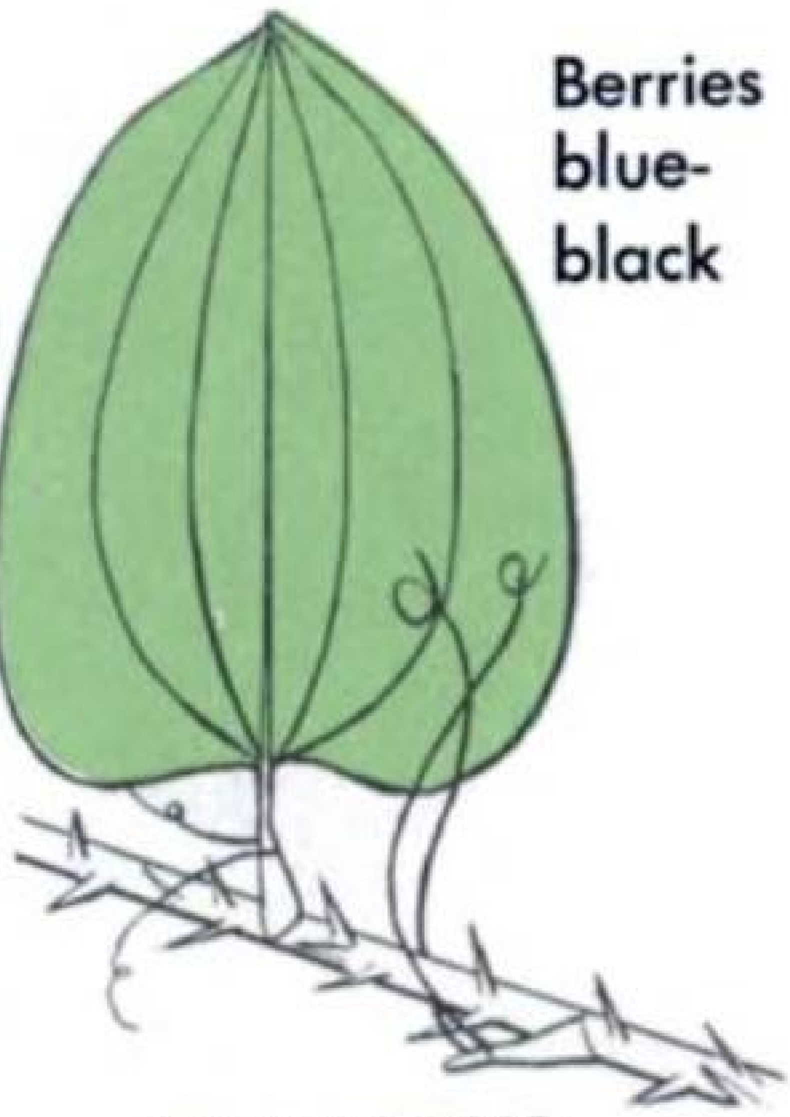
green beneath

white beneath

Stems round

Many thorns, but as weak prickles

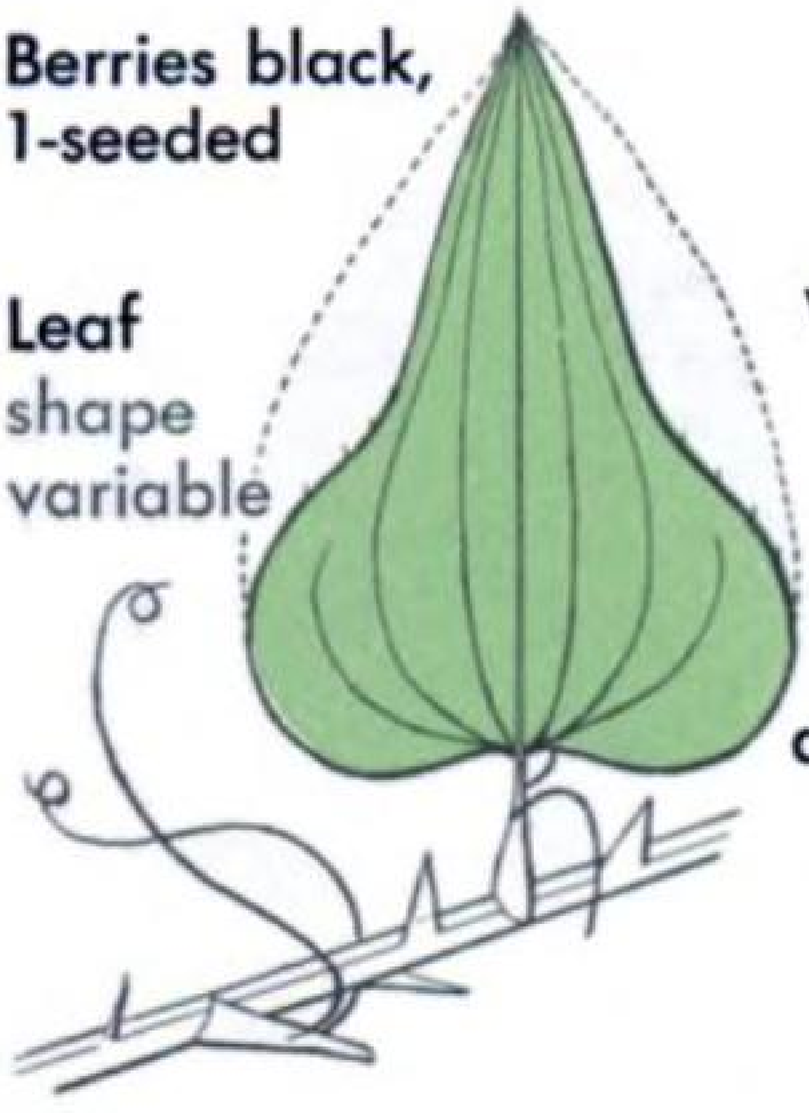
Berries blue-black



GLAUCOUS

Berries black, 1-seeded

Leaf shape variable



BULLBRIER

Leaves broad, leathery, green beneath

with

without

bristly "fringe"

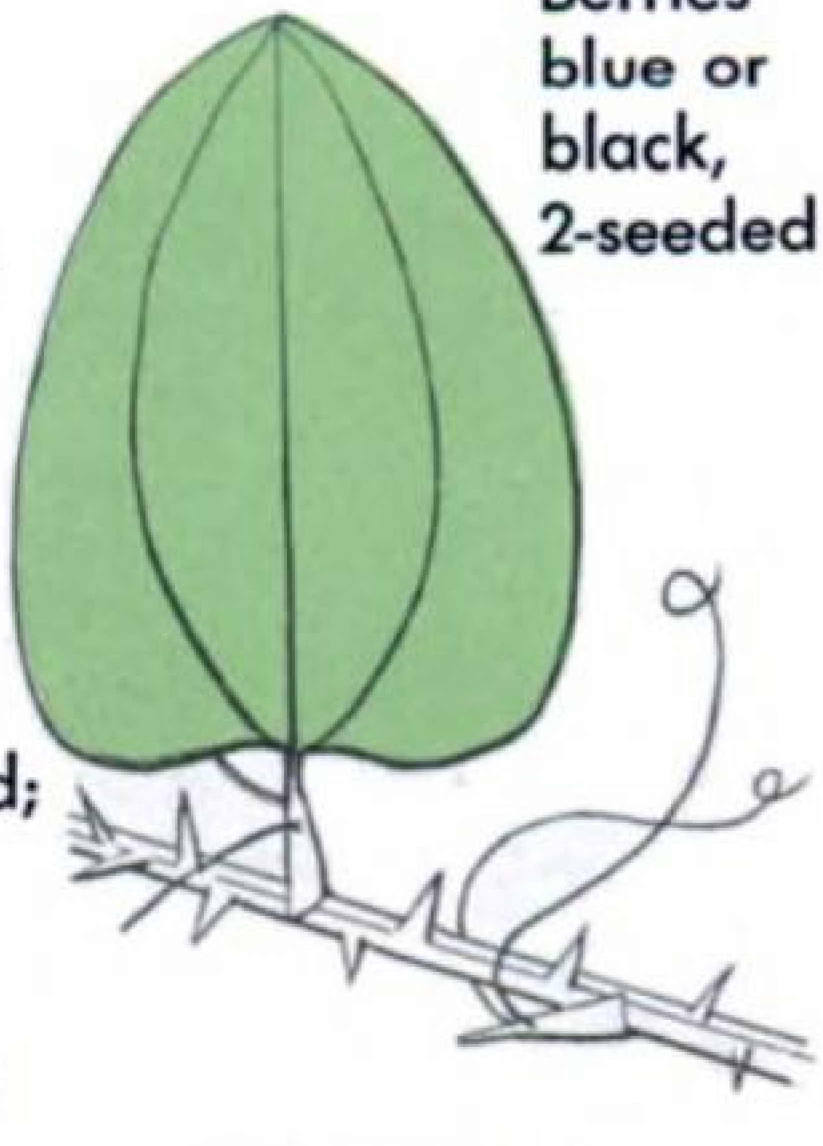
Stems

angled; bases scaly

angled or round; bases smooth

Many thorns, stout

Berries blue or black, 2-seeded



COMMON

GRAPES (1)

Dark-stemmed, thornless vines climbing by tendrils. Leaves variable, often deeply lobed; bases not remaining in winter.

GROUP I (Group II, Plate 35)

Twigs round, brown; older bark shreddy; pith not continuous; no tendrils opposite each 3rd leaf (except in Fox Grape and New England Grape, which have tendrils opposite most leaves).

Ia — Leaves red-woolly or very white beneath.

ʃ FOX GRAPE, *Vitis labrusca* p. 184
Fertile soils; s. Maine and s. Michigan to Georgia and Tennessee.
ʃ NEW ENGLAND GRAPE p. 185
V. novae-angliae (not illus.)

ʃ SUMMER GRAPE, *Vitis aestivalis* p. 185
Dry woods; Massachusetts, New York, Ohio, Michigan, and Wisconsin to Georgia and Texas.

ʃ SILVERLEAF GRAPE p. 185
Vitis aestivalis var. *argentifolia*
Woods; New Hampshire and s. Minnesota to se. Virginia. Alabama, and Kansas.
ʃ POSTOAK GRAPE, *V. lincecumii* (not illus.) p. 185

Ib — Leaves not woolly, though sometimes hairy, green beneath.

ʃ FROST GRAPE, *Vitis vulpina* p. 185
Bottomlands; se. New York, Illinois, and e. Kansas to Florida and Texas.

ʃ RIVERBANK GRAPE, *Vitis riparia* p. 186
Streambanks; New Brunswick, Quebec, Manitoba, and Montana to n. Virginia, W. Virginia, Tennessee, and New Mexico.
ʃ DUNE GRAPE p. 186
V. riparia var. *syrticola* (not illus.)

ʃ SAND GRAPE, *Vitis rupestris* p. 186
Sandy soils; Maryland, s. Pennsylvania, and Missouri to w. N. Carolina, Arkansas, and Texas.
ʃ BUSH GRAPE, *V. acerifolia* (not illus.) p. 186

GRAPES (2), AMPELOPSIS, ETC.

GROUP II (Group I, Plate 34)

Twigs or stems distinctively marked as indicated.

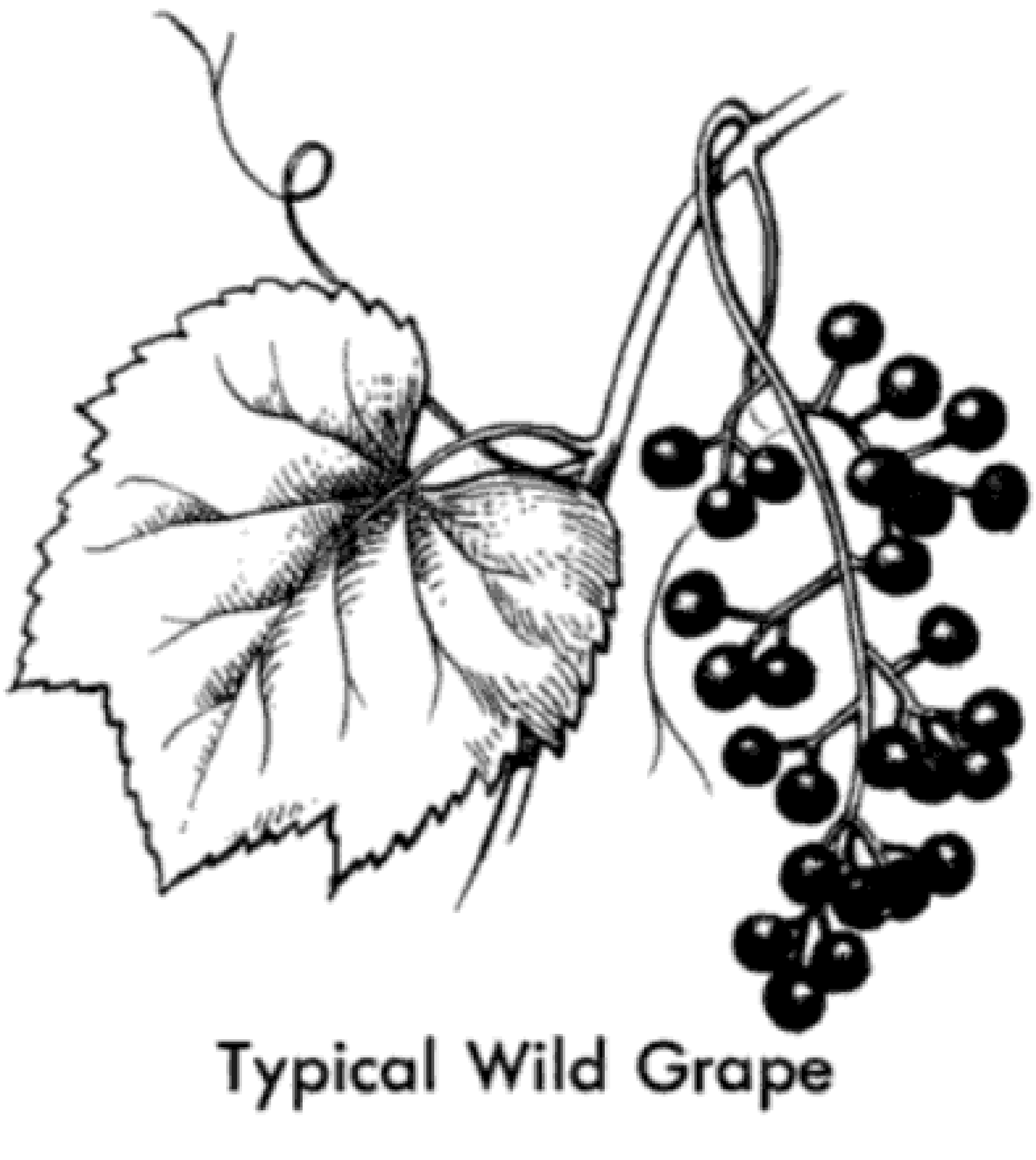
ʃ MUSCADINE GRAPE, *Vitis rotundifolia* p. 187
Woods and thickets; s. Delaware, Virginia, W. Virginia, s. Indiana, se. Missouri, and Oklahoma to Florida and Texas.

ʃ AMERICAN AMPELOPSIS, *Ampelopsis cordata* p. 187
Fertile woods; Virginia, s. Ohio, s. Illinois, and se. Nebraska to Florida and Mexico, rarely north to Massachusetts.
ʃ ASIATIC AMPELOPSIS p. 187
A. brevipedunculata (not illus.)

ʃ CAT GRAPE, *Vitis palmata* p. 187
Wet thickets and woods; s. Indiana, Illinois, and se. Iowa to Louisiana and Texas.

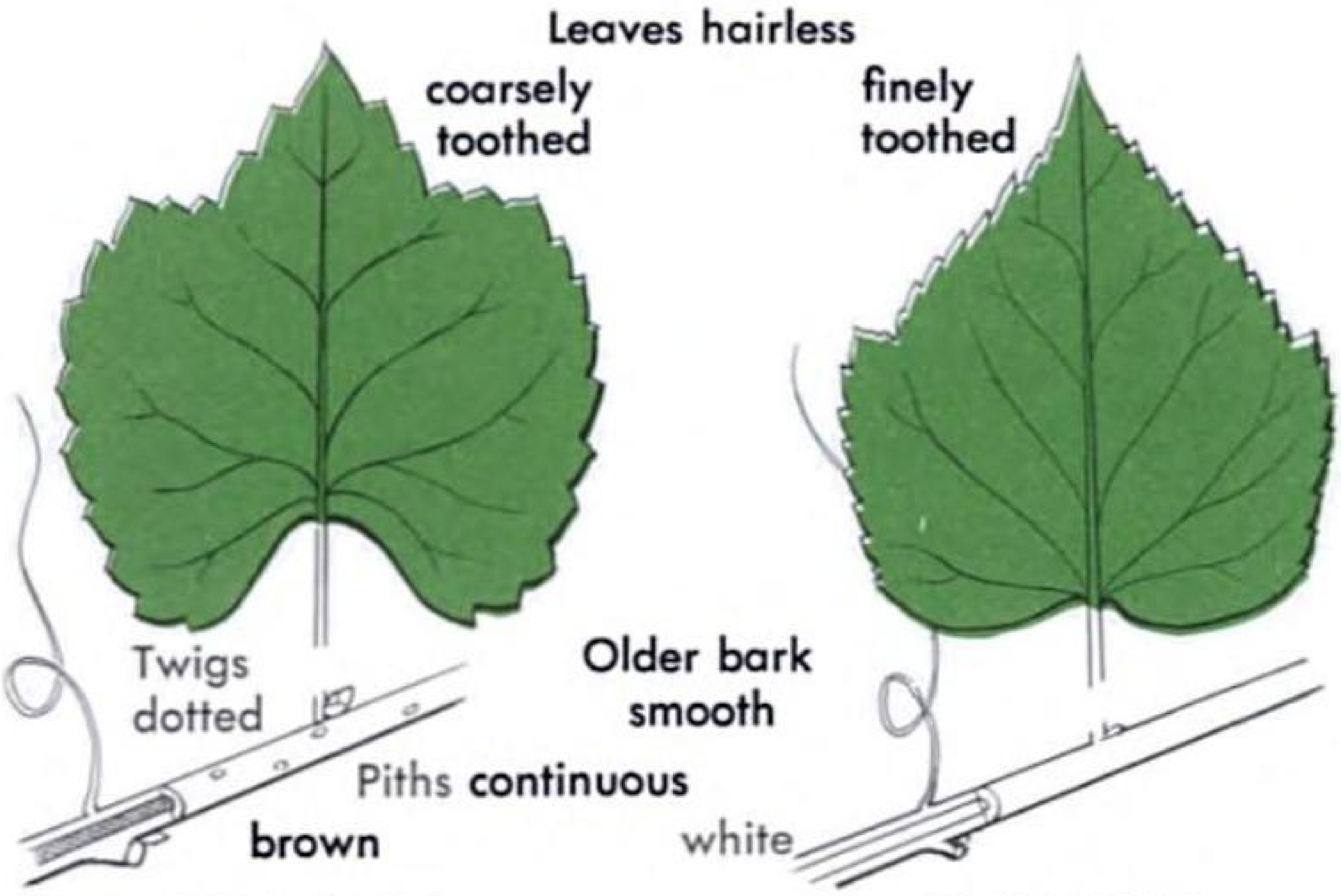
ʃ WINTER GRAPE, *Vitis cinerea* p. 187
Bottomlands; se. Virginia, s. Ohio, Illinois, Iowa, and Nebraska to Florida and e. Texas.
ʃ POSSUM GRAPE, *V. baileyana* (not illus.) p. 188

ʃ BOSTON IVY p. 188
Parthenocissus tricuspidata (not illus.)
Buildings and trees; occasionally escapes from cultivation.



Typical Wild Grape

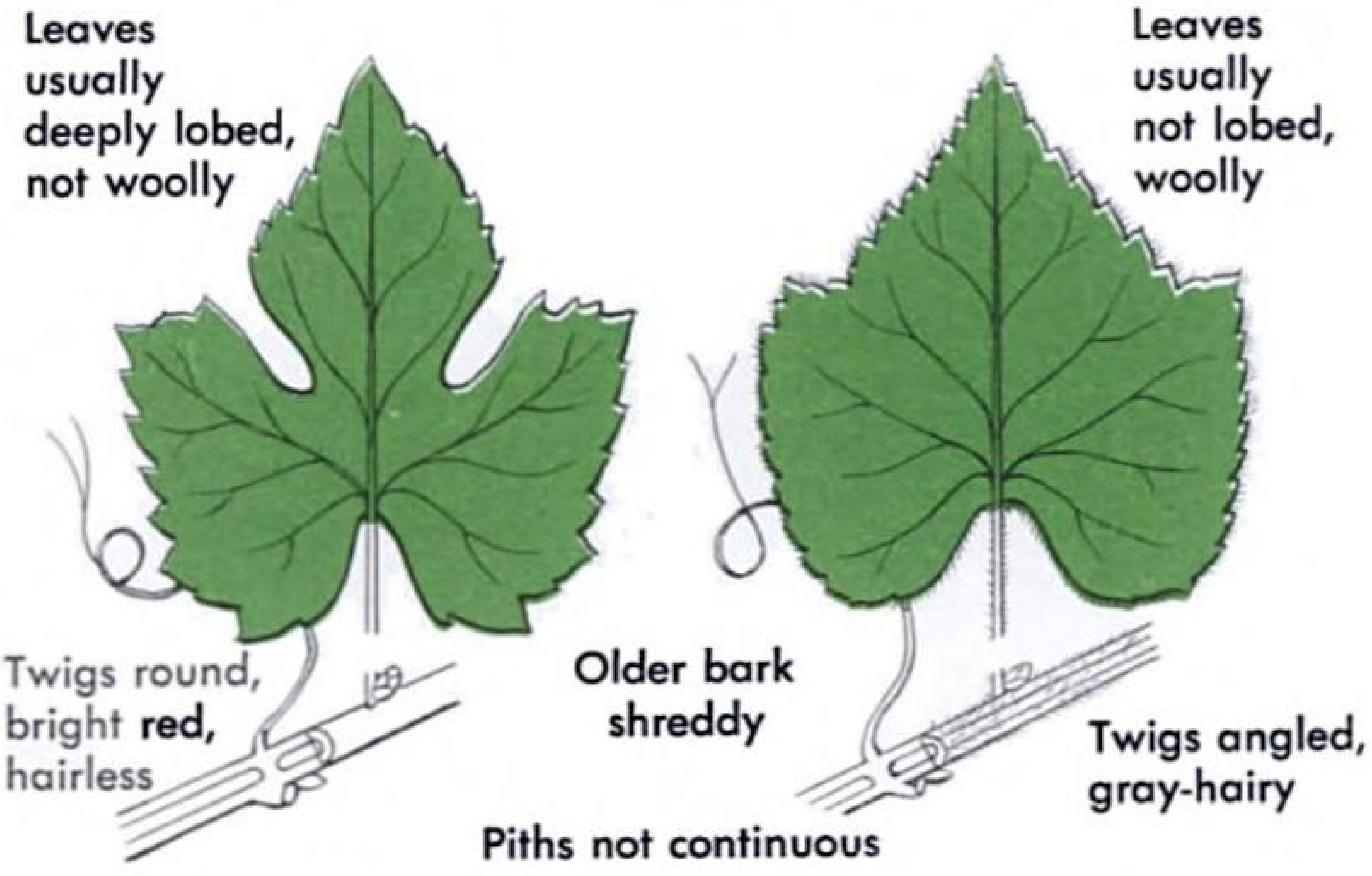
Tendrils not forked, sometimes few


Leaves hairless
coarsely toothed
finely toothed
Twigs dotted
Older bark smooth
Piths continuous
brown
white

MUSCADINE GRAPE

AMERICAN AMPELOPSIS

Tendrils forked, only every 3rd one lacking


Leaves usually deeply lobed, not woolly
Leaves usually not lobed, woolly
Twigs round, bright red, hairless
Older bark shreddy
Twigs angled, gray-hairy
Piths not continuous

CAT GRAPE

WINTER GRAPE

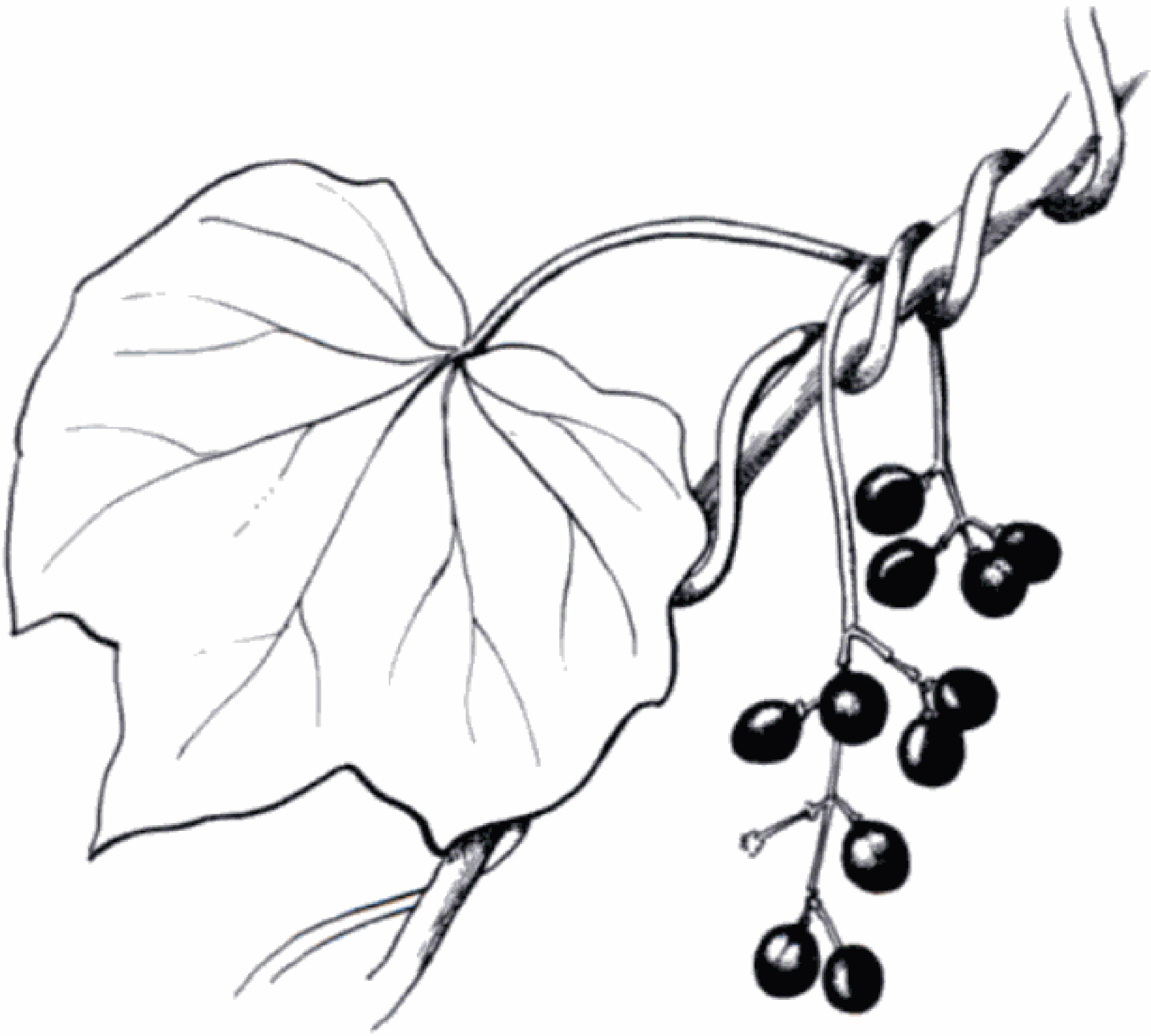
MOONSEEDS

Thornless, nonevergreen vines, usually with lobed or nearly lobed leaves, which climb by green twining stems.

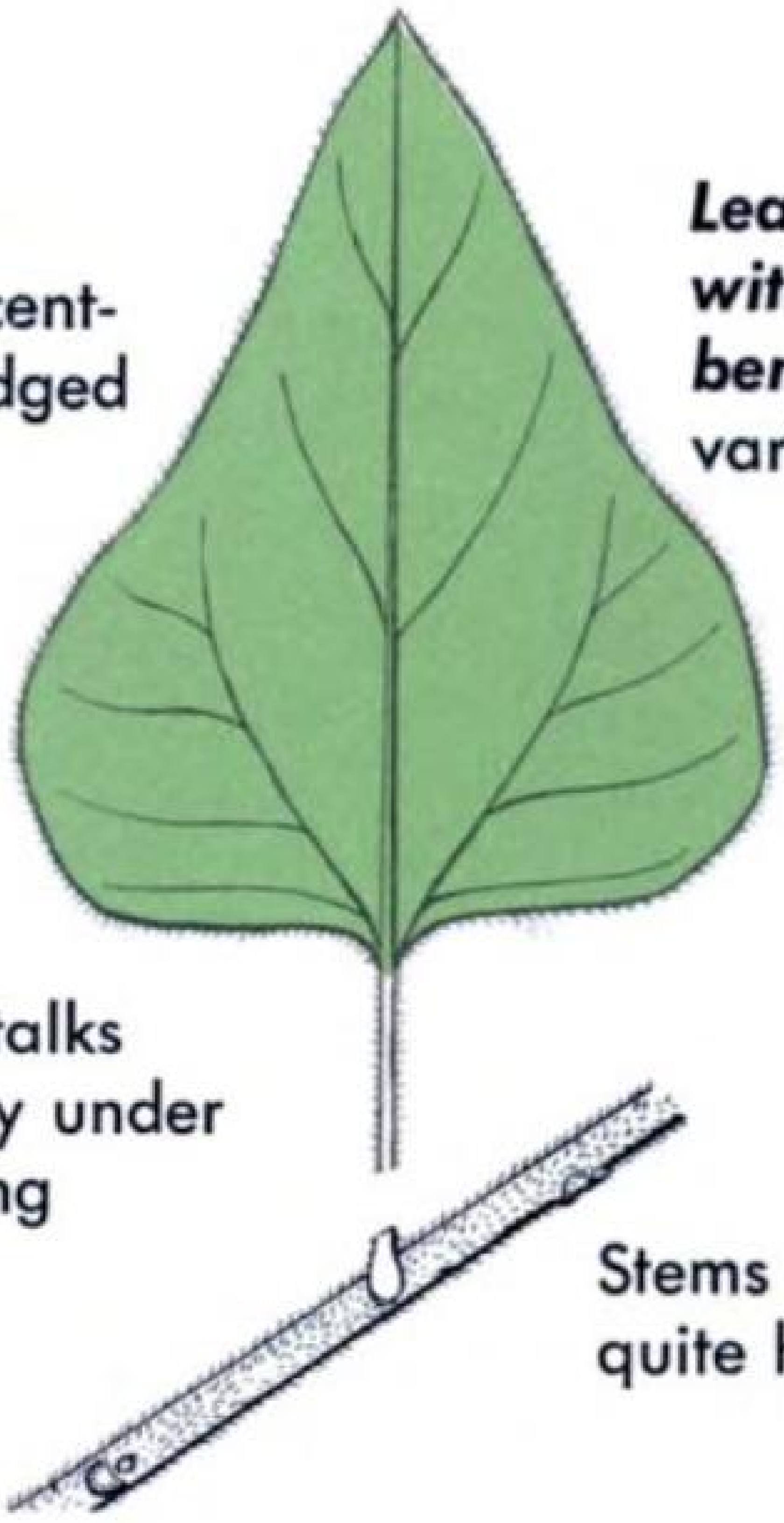
∫ REDBERRY MOONSEED, *Cocculus carolinus* p. 188
Thickets; se. Virginia, Illinois, Missouri, and se. Kansas to Florida and Texas.

∫ CUPSEED, *Calycocarpum lyoni* p. 188
Fertile soils; Kentucky, s. Illinois, and e. Kansas to Florida and Louisiana.

∫ CANADA MOONSEED, *Menispermum canadense* p. 189
Streambanks; w. New England, w. Quebec, and se. Manitoba to Georgia, Alabama, Arkansas, and Oklahoma.



CANADA MOONSEED



Fruits red; seeds crescent-shaped, ridged

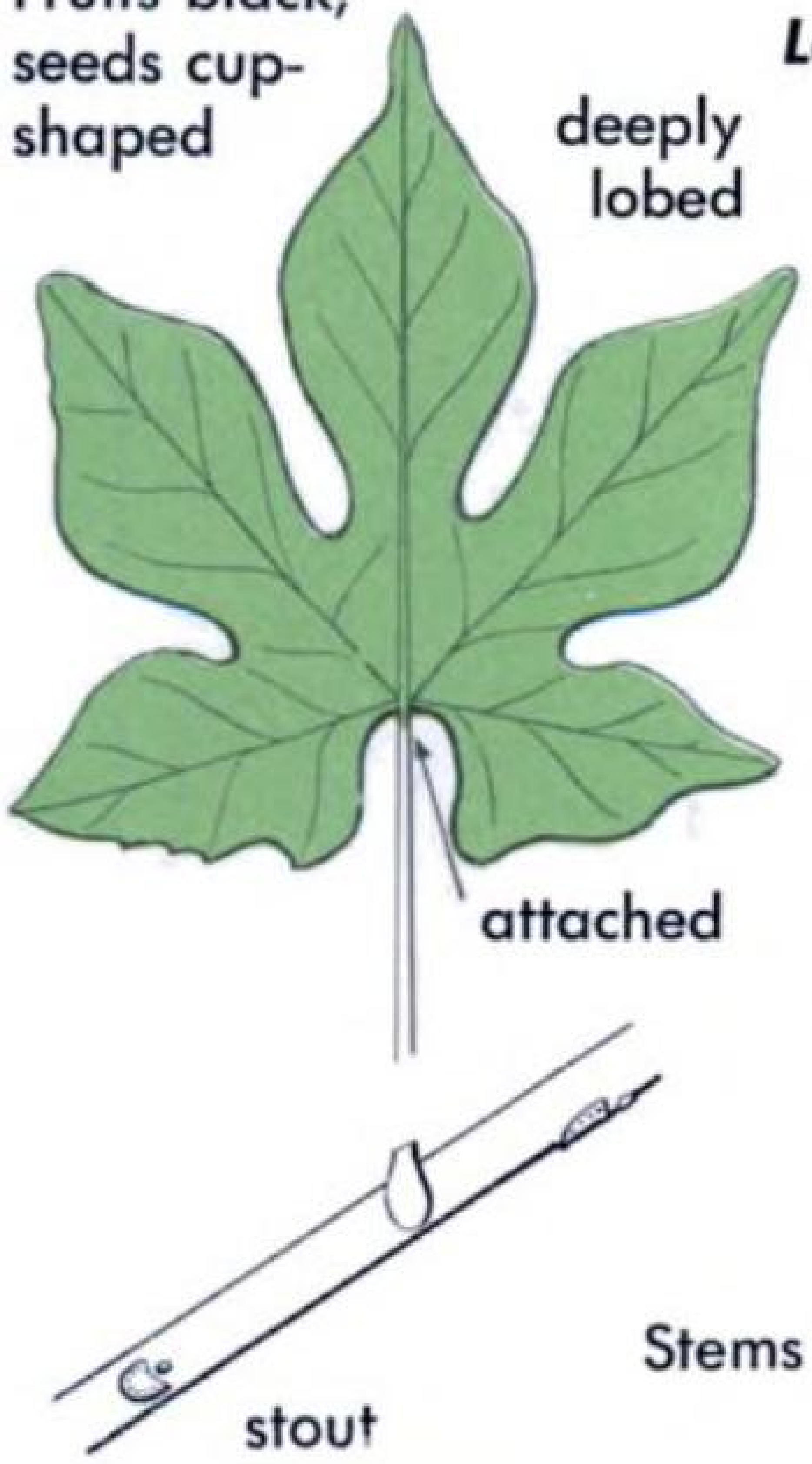
Leaves covered with fine hairs beneath, variably shaped

Leafstalks mostly under 2″ long

Stems usually quite hairy

REDBERRY MOONSEED

Leaves hairless

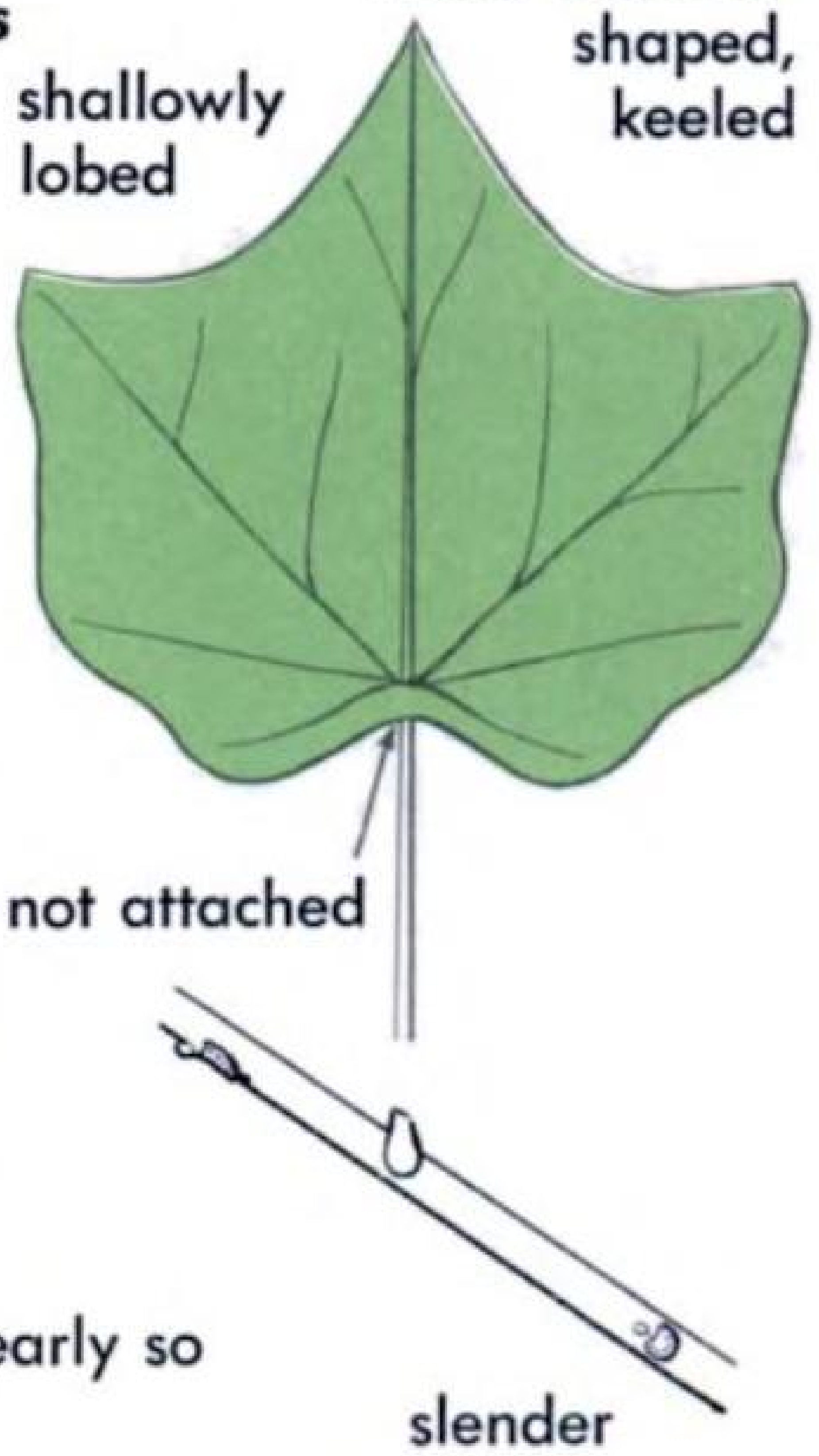


Fruits black; seeds cup-shaped

deeply lobed

attached

stout



Fruits black; seeds crescent-shaped, keeled

shallowly lobed

not attached

slender

Bases of leaf blades

to leafstalks

Leafstalks 2″–6″ long

Stems hairless or nearly so

CUPSEED

CANADA MOONSEED

MISCELLANEOUS VINES WITHOUT TENDRILS

Vines that climb by twining stems or aerial rootlets or scramble overground.

ʃ ENGLISH IVY, *Hedera helix* (not illus.) p. 189

ʃ AMERICAN BITTERSWEET, *Celastrus scandens* p. 189
Fencerows and woods; s. Quebec and s. Manitoba to Georgia, Louisiana, and Oklahoma.
ʃ ASIATIC BITTERSWEET p. 190
C. orbiculatus (not illus.)

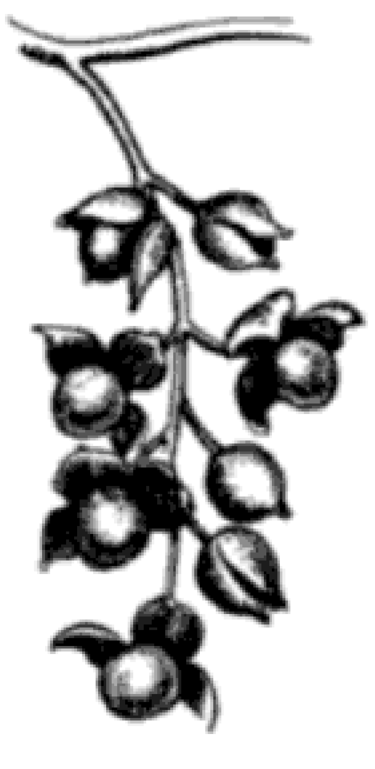
ʃ SUPPLEJACK, *Berchemia scandens* p. 190
Bottomlands; Virginia, Tennessee, and Missouri to Florida and Texas.

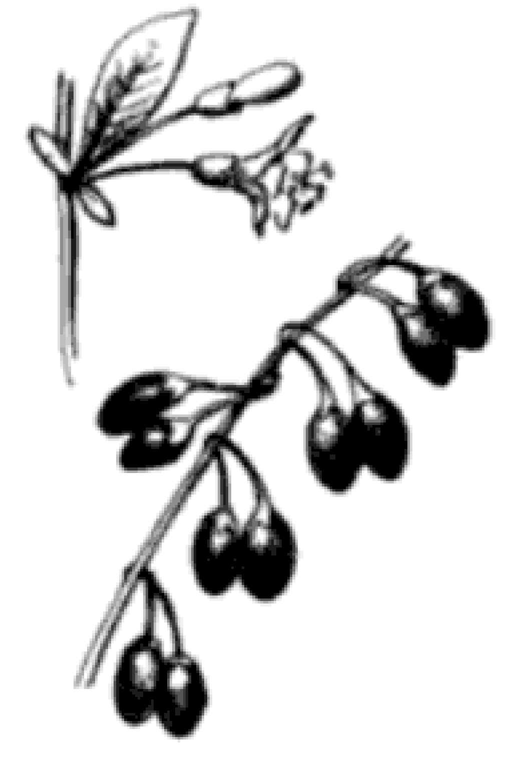
ʃ EUROPEAN MATRIMONY-VINE p. 190
Lycium halimifolium
Waste ground; local from s. Canada southward.
ʃ CHINESE MATRIMONY-VINE p. 190
L. chinense (not illus.)

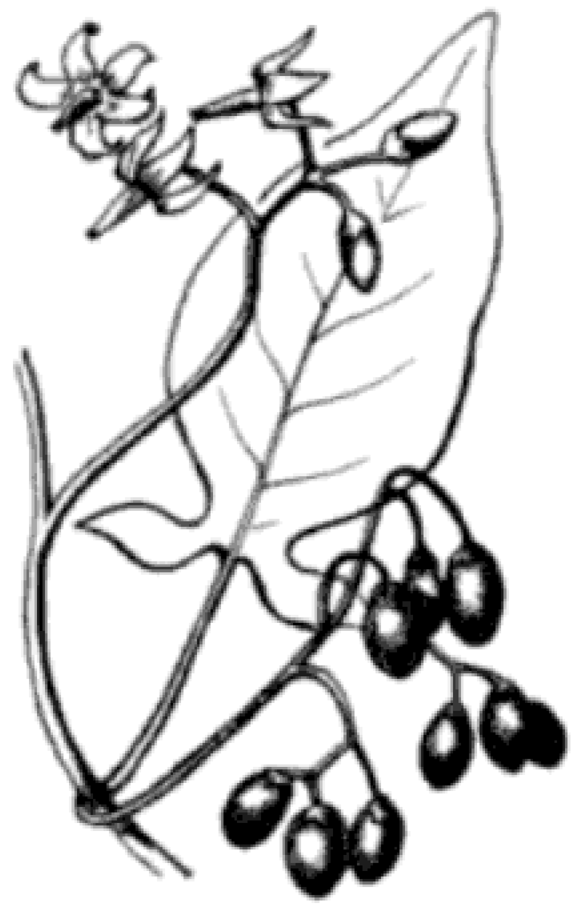
ʃ BITTER NIGHTSHADE, *Solanum dulcamara* p. 190
Waste areas near houses; throughout our area.

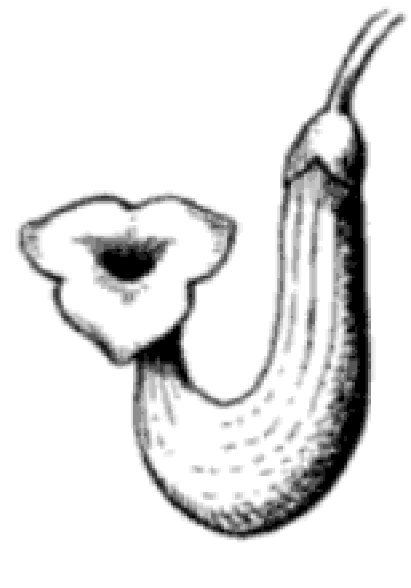
ʃ DUTCHMAN'S-PIPE, *Aristolochia durior* p. 191
Fertile Appalachian forests; New England and sw. Pennsylvania to Georgia and Alabama.

ʃ WOOLLY PIPE-VINE, *Aristolochia tomentosa* p. 191
Woods; N. Carolina, sw. Indiana, s. Illinois, Missouri, and se. Kansas to Florida and e. Texas; naturalized in w. New York.

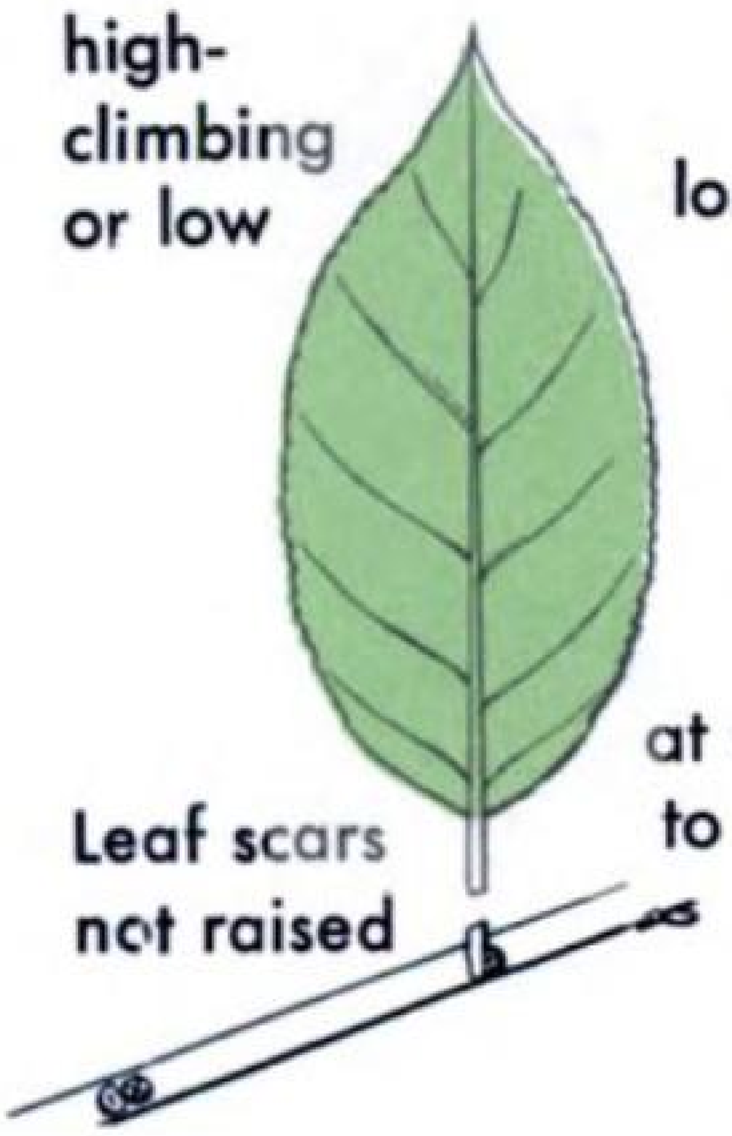

BITTERSWEET


MATRIMONY-VINE


NIGHTSHADE


DUTCHMAN'S-PIPE

high-climbing or low



Leaf scars not raised

Leaves egg-shaped, wavy-toothed

long-pointed, few veins

less pointed, many veins

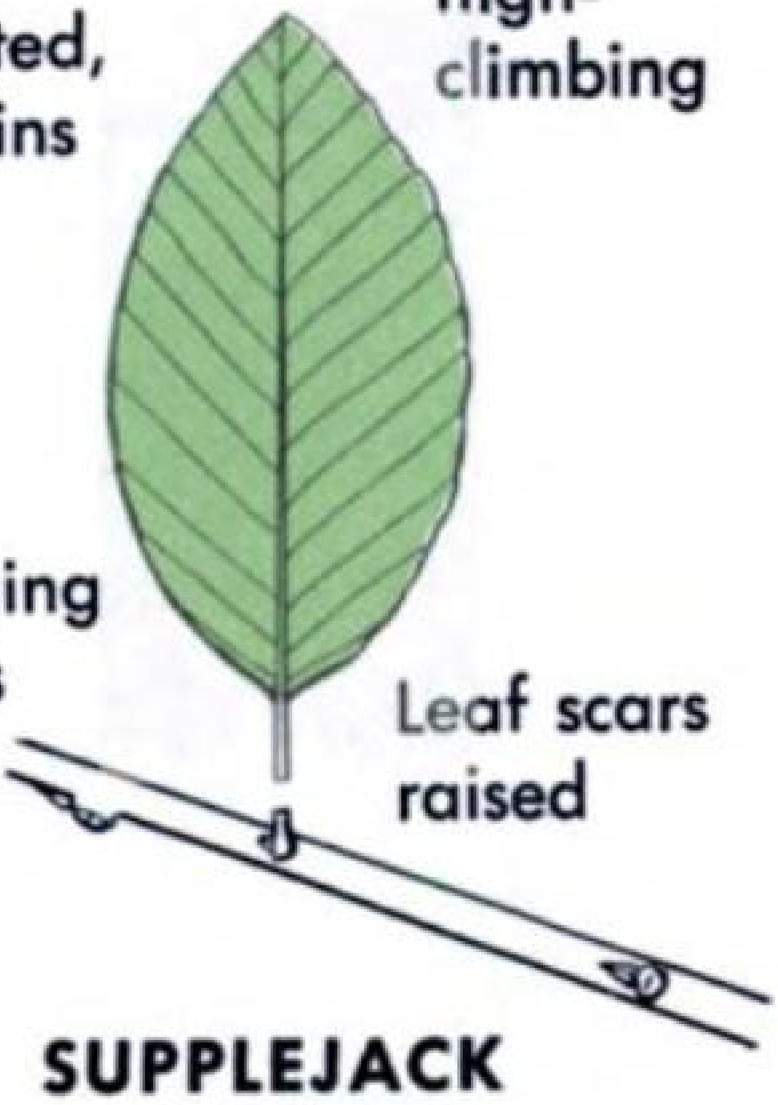
Buds not woolly

at angle to twigs

hugging twigs

Stems round, thornless, hairless

high-climbing

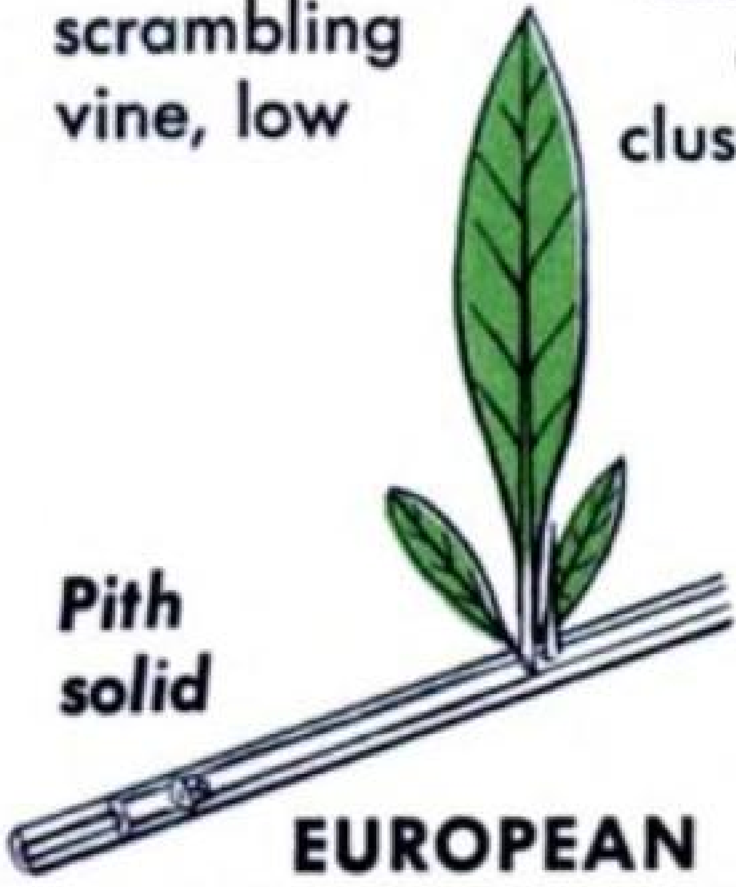


Leaf scars raised

AMERICAN BITTERSWEET

SUPPLEJACK

scrambling vine, low



Pith solid

Leaves not toothed

narrow, often clustered

usually lobed

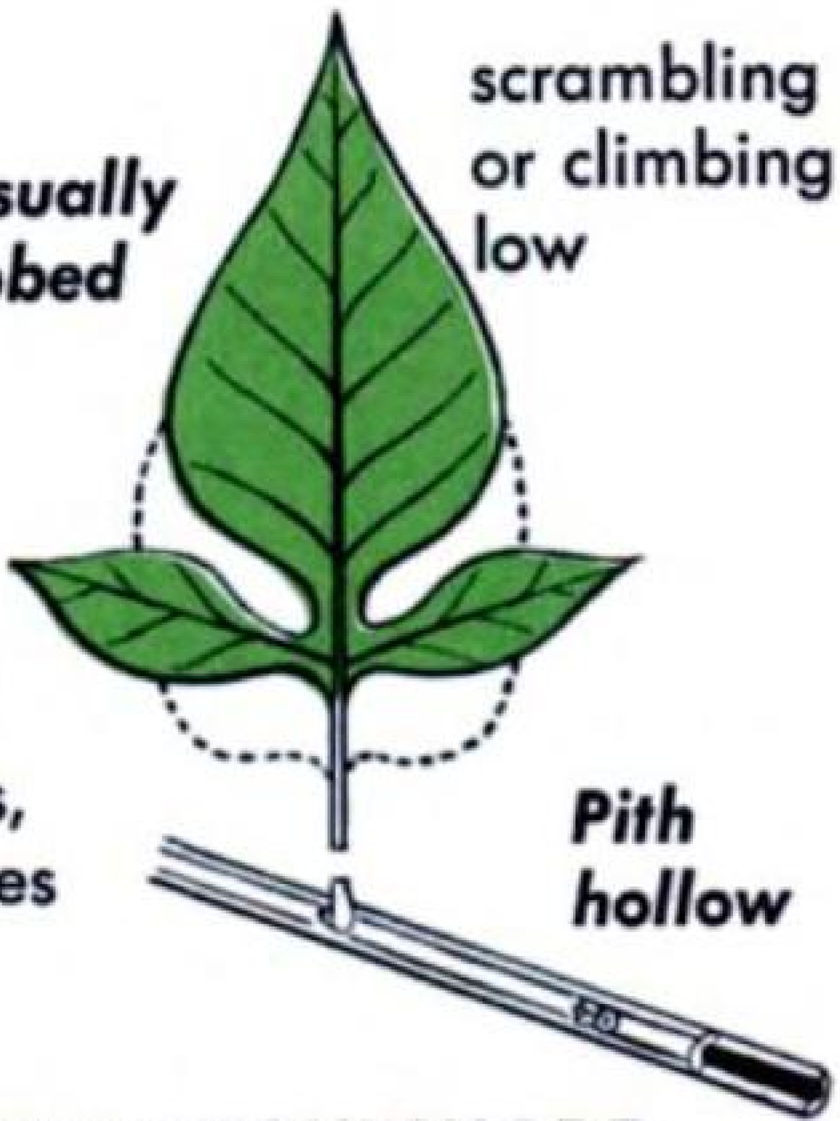
Buds not woolly

Stems usually ridged

often thorny

thornless, sometimes hairy

scrambling or climbing low

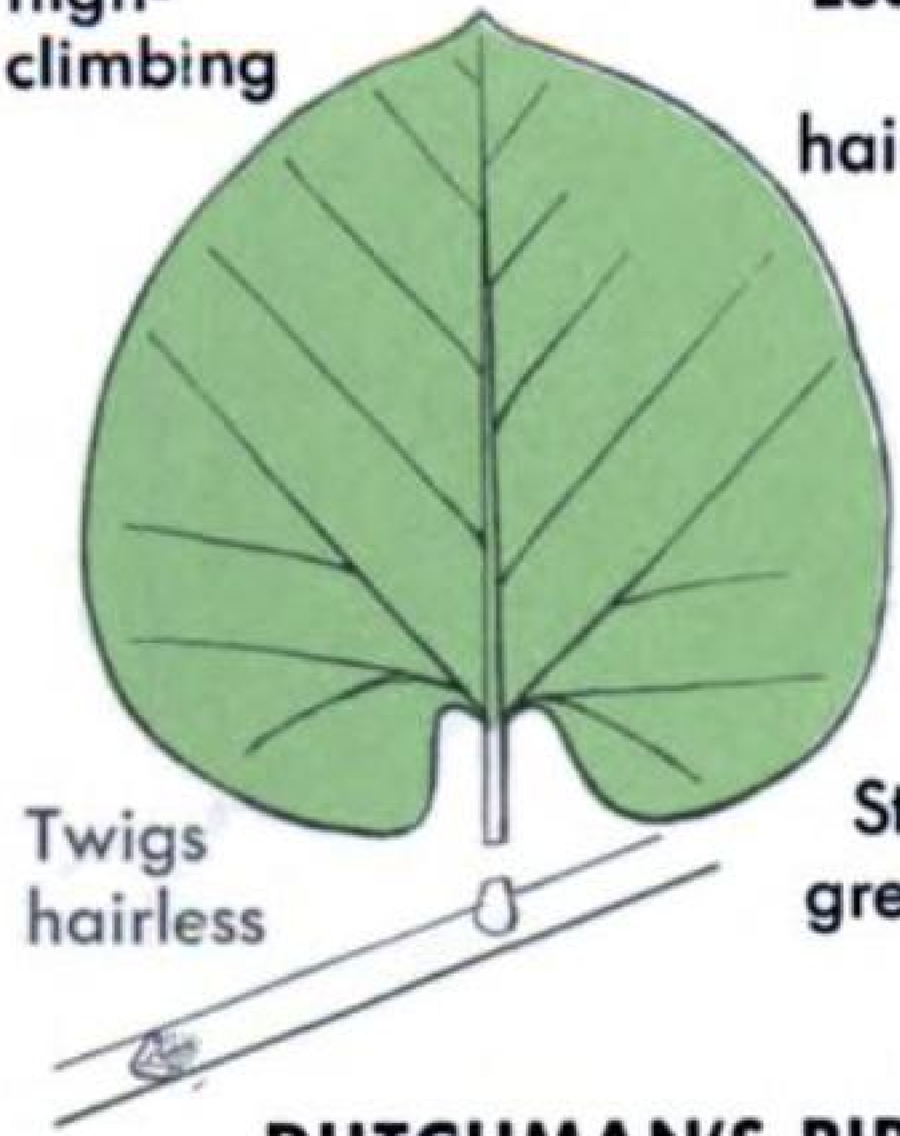


Pith hollow

EUROPEAN MATRIMONY-VINE

BITTER NIGHTSHADE

high-climbing



Twigs hairless

Leaves heart-shaped, not toothed

hairless

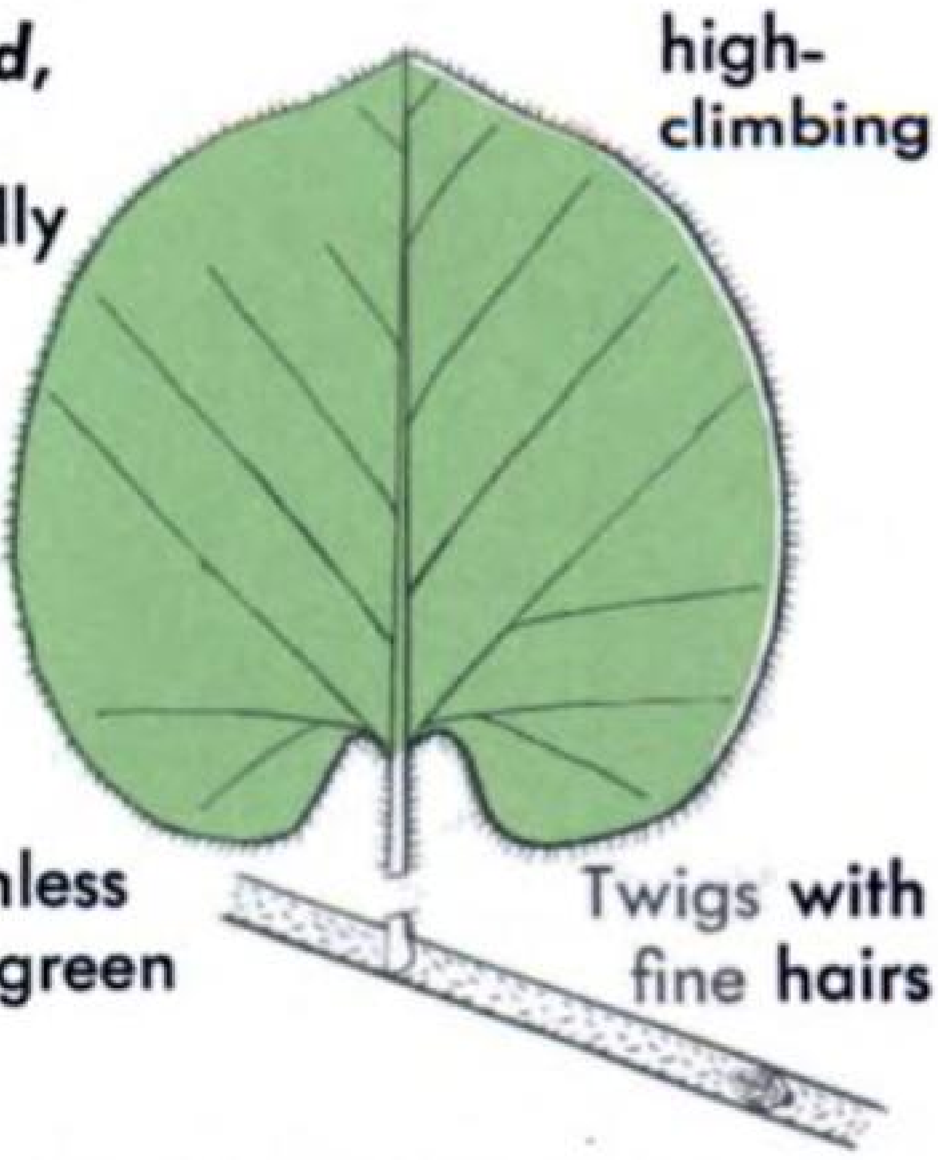
woolly

Stems round, thornless

green

blue-green

high-climbing



Twigs with fine hairs

DUTCHMAN'S-PIPE

WOOLLY PIPE-VINE

MISCELLANEOUS UPRIGHT THORNY PLANTS

whose leaves are mostly not lobed. They may be clustered on short "spur" branches (right) except in Firethorn and Devil's-club (see text). Also see Autumn-olive, (p. 293). Plums are the only plants of this group with glands frequently present on the leafstalks (see text).

↟ OSAGE-ORANGE, *Maclura pomifera* p. 191
Thickets; s. New England, New York, Iowa, and e. Kansas to Georgia and Texas; also Washington and Oregon.

↟Ѱ EASTERN BUMELIA, *Bumelia lycioides* p. 192
Coastal Plain bottomlands; se. Virginia to n. Florida, west to e. Texas, and north in Mississippi Valley to s. Indiana, s. Illinois, and se. Missouri.
  Ѱ SMALL BUMELIA, *B. smallii* (not illus.) p. 192
  ↟Ѱ WOOLLY BUMELIA, *B. lanuginosa* (not illus.) p. 192

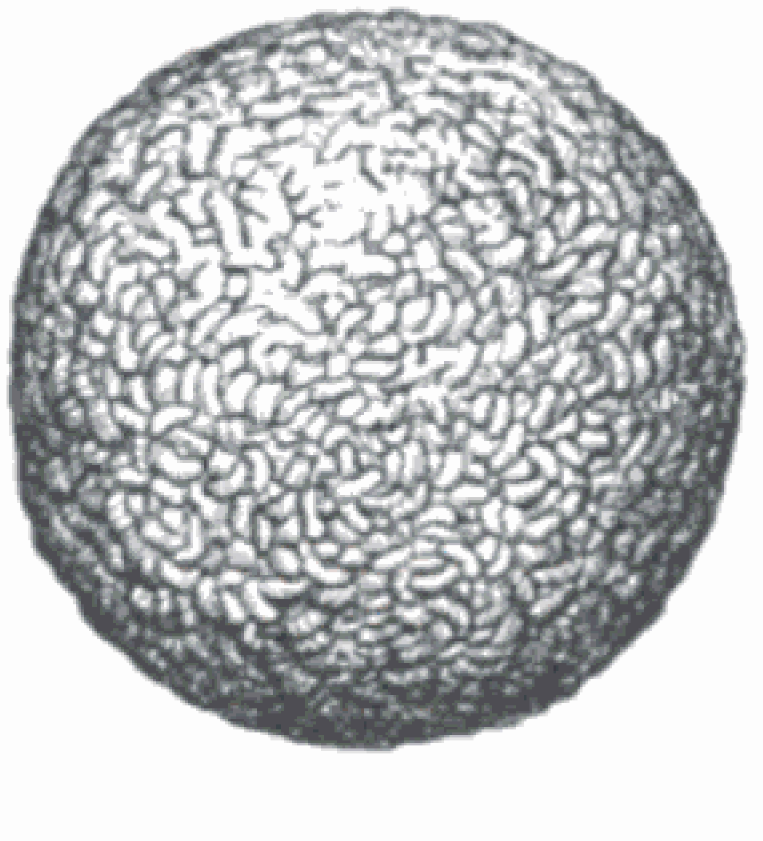
Ѱ FIRETHORN, *Cotoneaster pyracantha* p. 192
Thickets; escape, Pennsylvania to Florida and Louisiana.

Ѱ AMERICAN BARBERRY, *Berberis canadensis* p. 193
Dry woods; w. Virginia and se. Missouri to Georgia.
  Ѱ EUROPEAN BARBERRY, *B. vulgaris* (not illus.) p. 193
  Ѱ JAPANESE BARBERRY, *B. thunbergii* (not illus.) p. 193

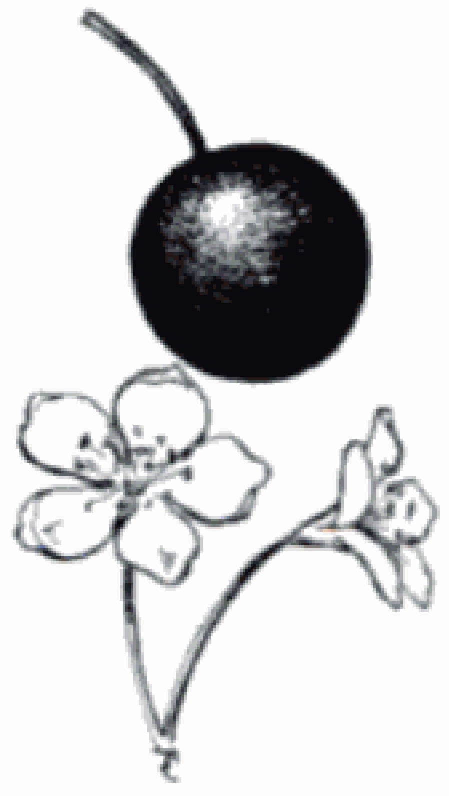
↟Ѱ AMERICAN PLUM, *Prunus americana* p. 194
Thickets; Massachusetts, New York, s. Ontario, s. Manitoba and w. Montana to nw. Florida and New Mexico.
  ↟Ѱ CANADA PLUM, *P. nigra* (leaf edge illus.) p. 195
  ↟Ѱ CHICKASAW PLUM, *P. angustifolia* (not illus.) p. 195
  ↟Ѱ BULLACE PLUM, *P. insititia* (not illus.) p. 195
  ↟Ѱ SLOE PLUM, *P. spinosa* (not illus.) p. 195

↟Ѱ AMERICAN CRABAPPLE, *Pyrus coronaria* p. 196
Rich woods, thickets; centr. New York, s. Ontario, and e. Kansas to w. S. Carolina and n. Alabama.
For other native crabapples not illustrated, see pages 195–97.

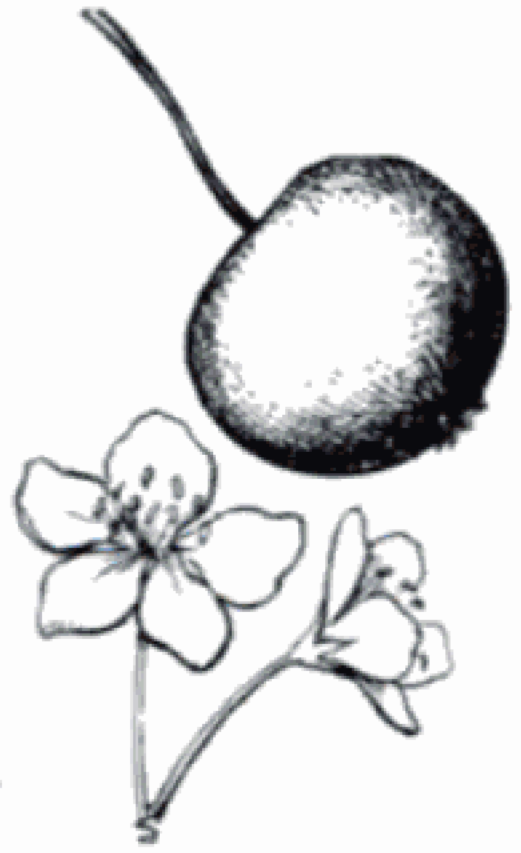
  Ѱ DEVIL'S-CLUB, *Oplopanax horridus* (not illus.) p. 197



OSAGE-ORANGE



AMERICAN PLUM



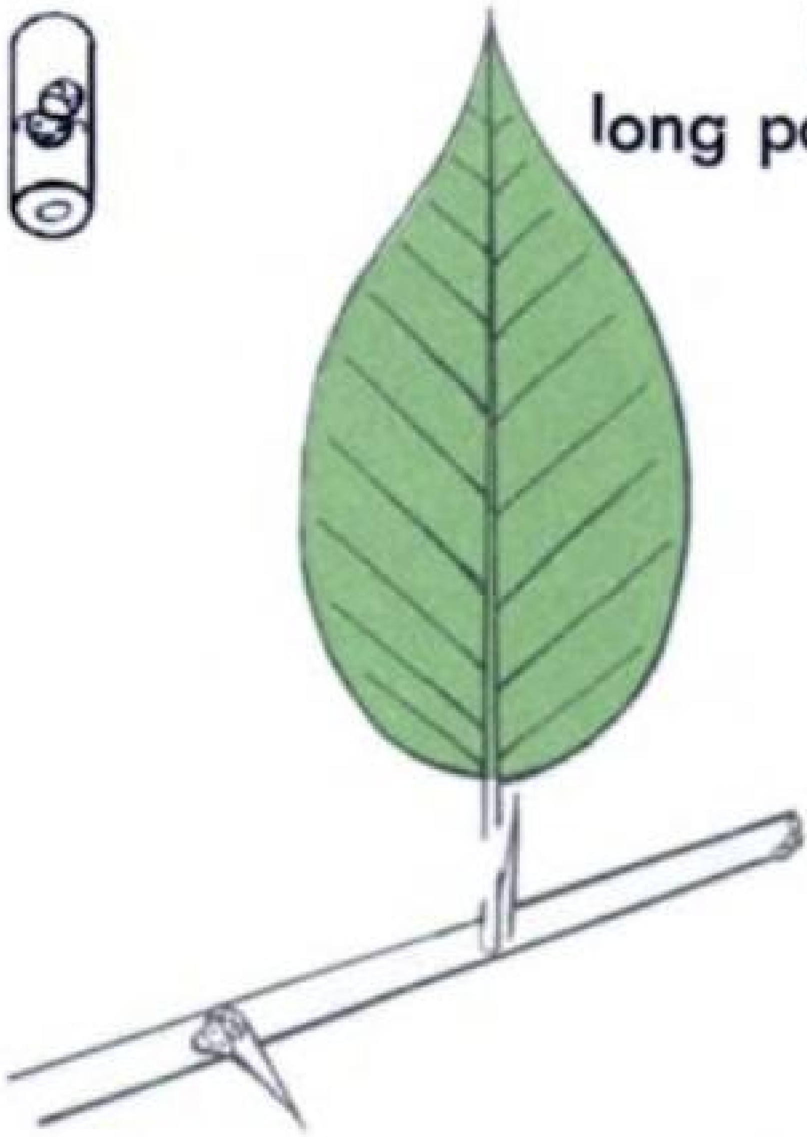
CRABAPPLE

Leaves not toothed
long point short point
not evergreen

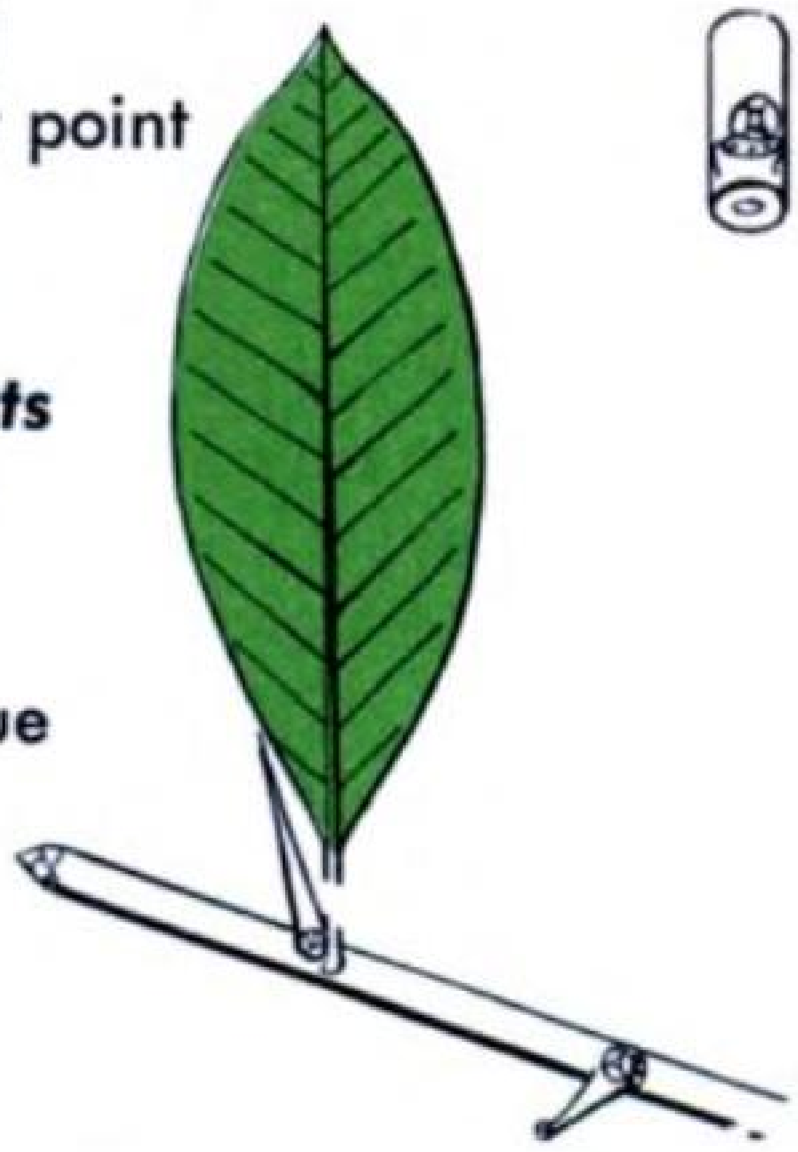
Only thorny plants with milky sap

End buds
false true

Thorns sharp,
not branched



OSAGE-ORANGE



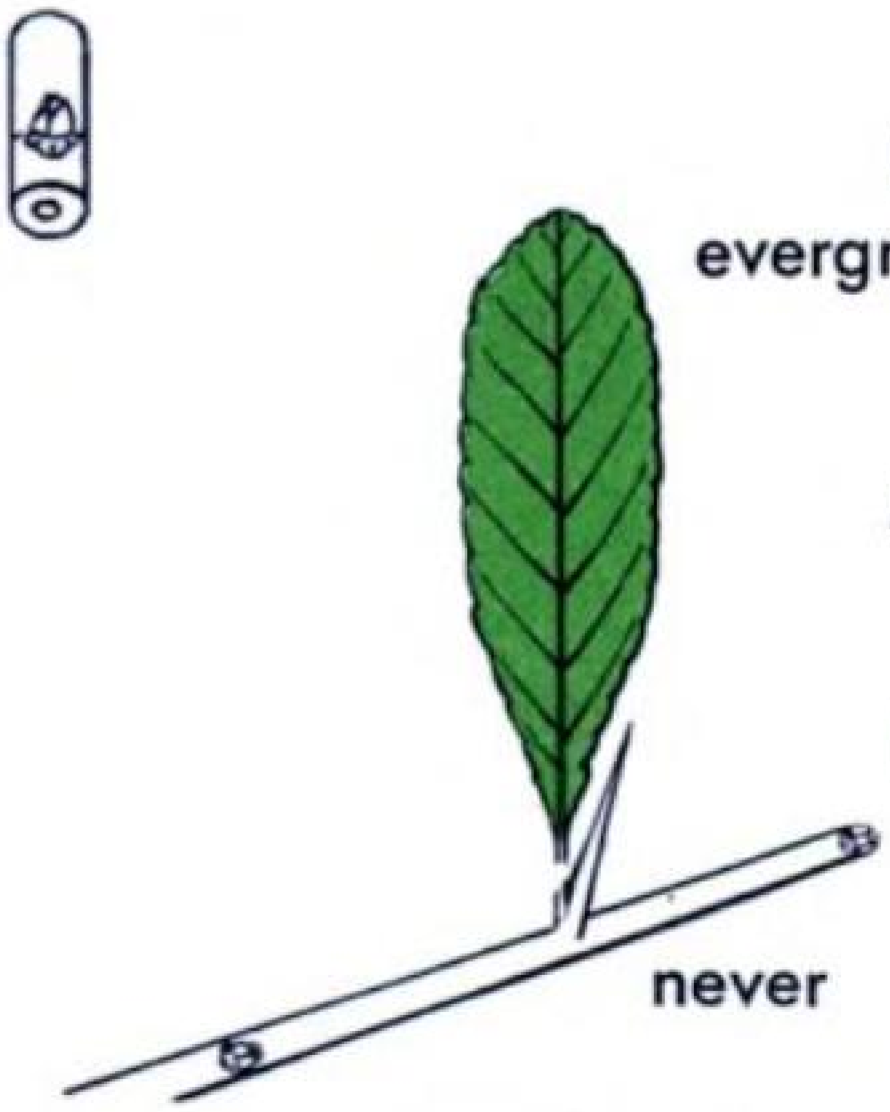
EASTERN BUMELIA

Leaves toothed
evergreen not evergreen

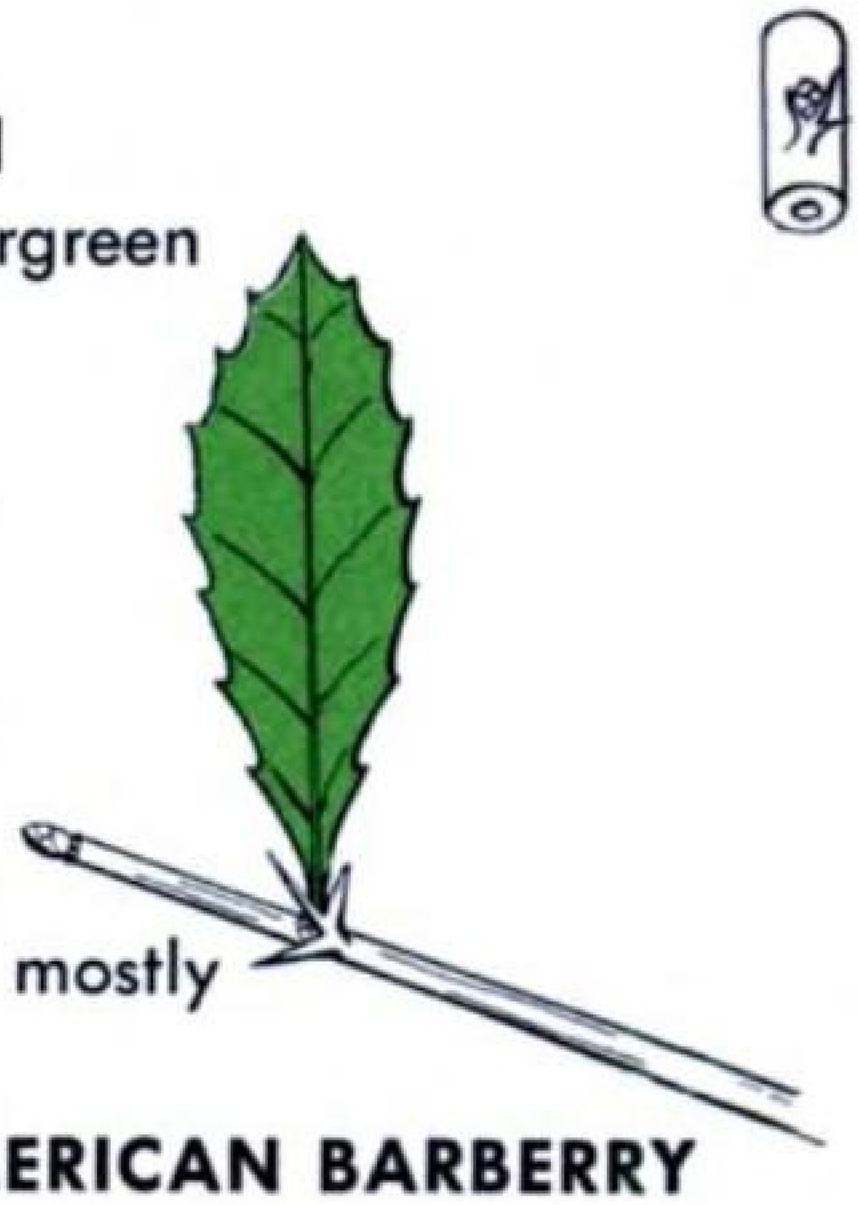
Sap not milky

End buds true

Thorns sharp
never mostly
branched



FIRETHORN



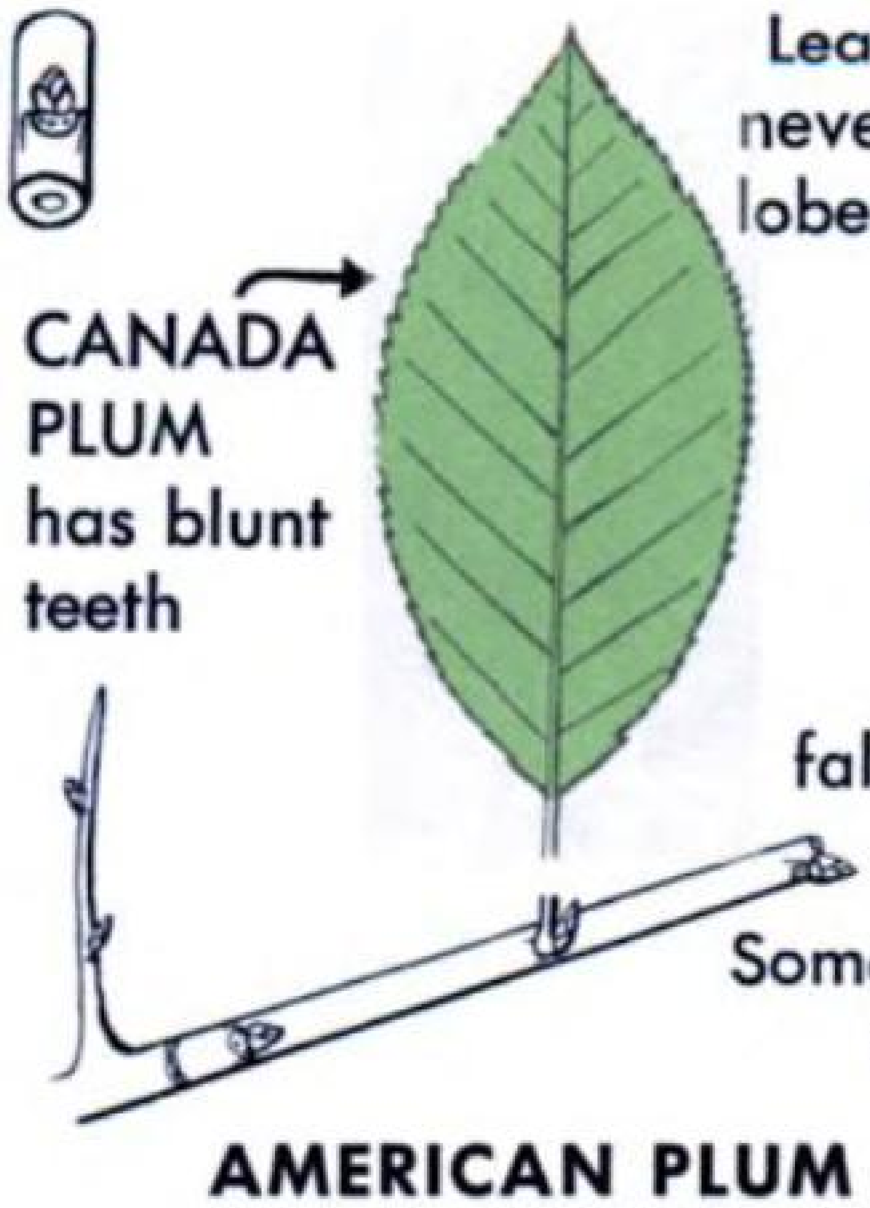
AMERICAN BARBERRY

Leaves usually toothed
never occasionally
lobed lobed
not evergreen

Sap not milky

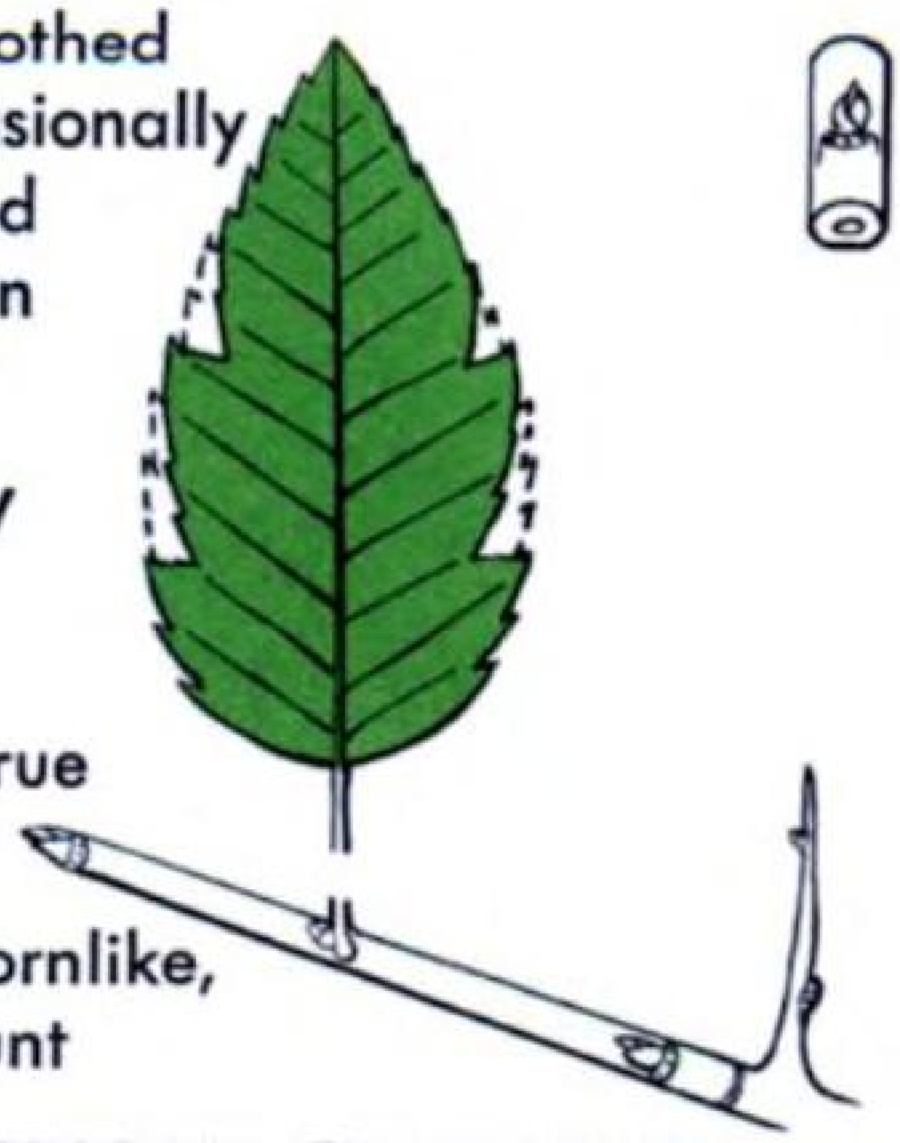
End buds
false true

Some branches thornlike,
sometimes blunt



CANADA PLUM has blunt teeth

AMERICAN PLUM



AMERICAN CRABAPPLE

HAWTHORNS

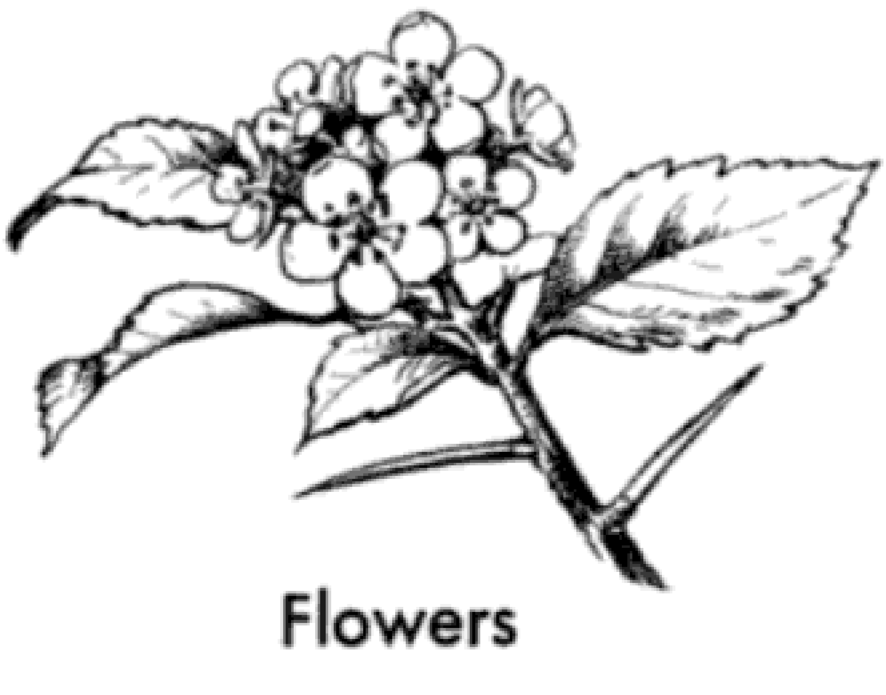
(p. 197)

Very dense, usually long-thorny shrubs or small trees. The only simple-leaved plants with nonleafy thorns mostly over 1 inch long. Spur branches may be present. Leaves toothed, variable, either not lobed or feather-lobed (rarely fan-lobed).

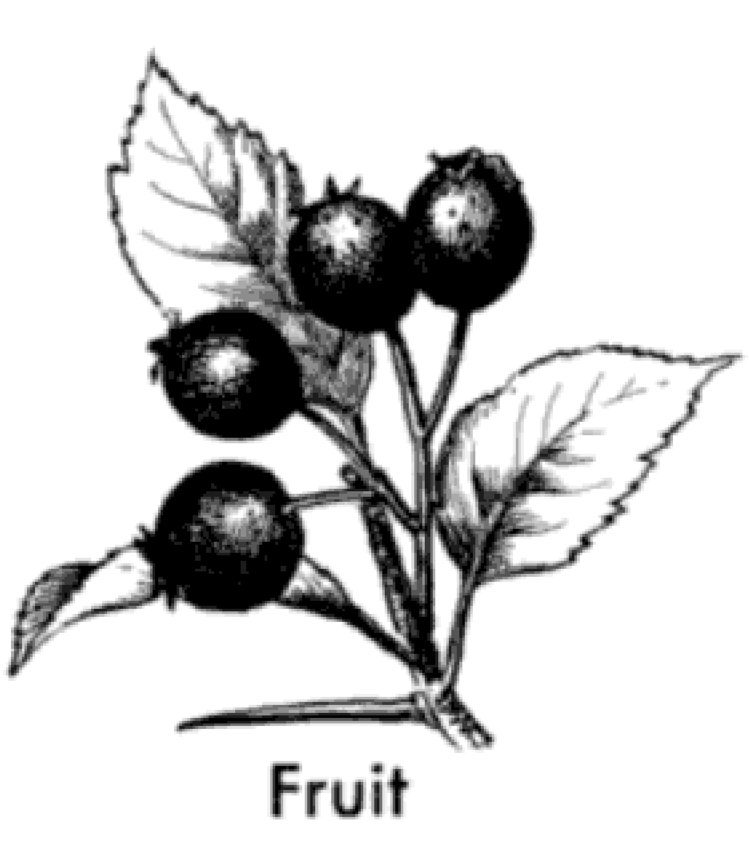
↟V These plants, distinctive though they are as a group, are virtually indistinguishable as species to all except the few botanists who have given the genus special study. Frequent hybridization complicated by great individual variation confounds accurate identification.

The number of species of hawthorns (*Crataegus*) in this country has been variously determined as over 1000 and as less than 100. In this book, therefore, no attempt is made to differentiate between the many species of hawthorns. The drawings opposite serve only to indicate the major leaf types as an aid to identification of the genus.

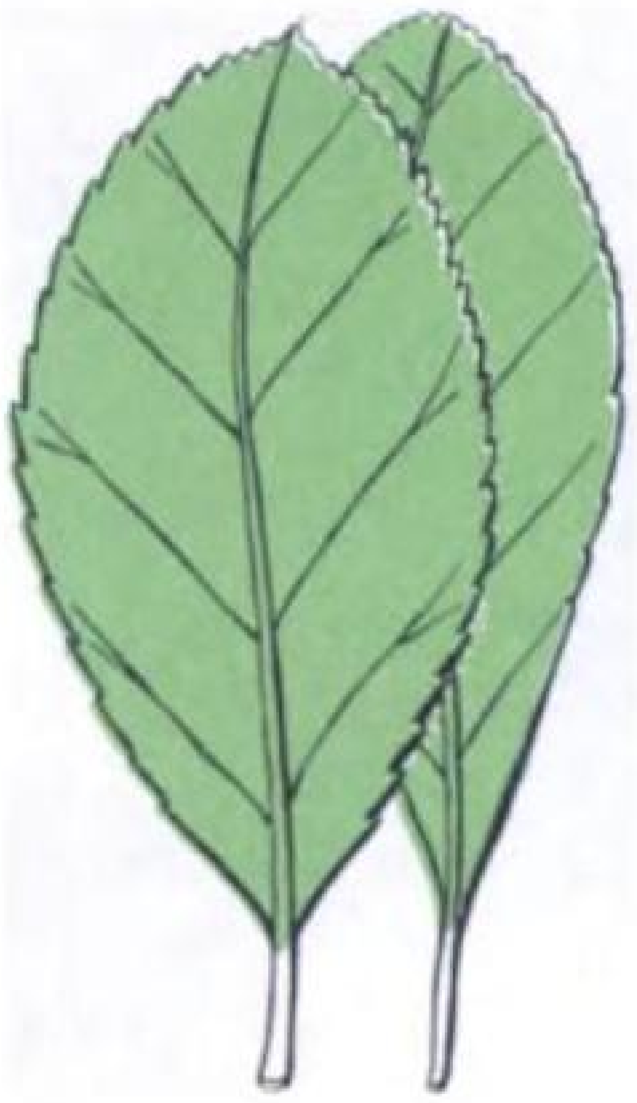
For the amateur it seems best simply to call them hawthorns and not attempt to be more specific.



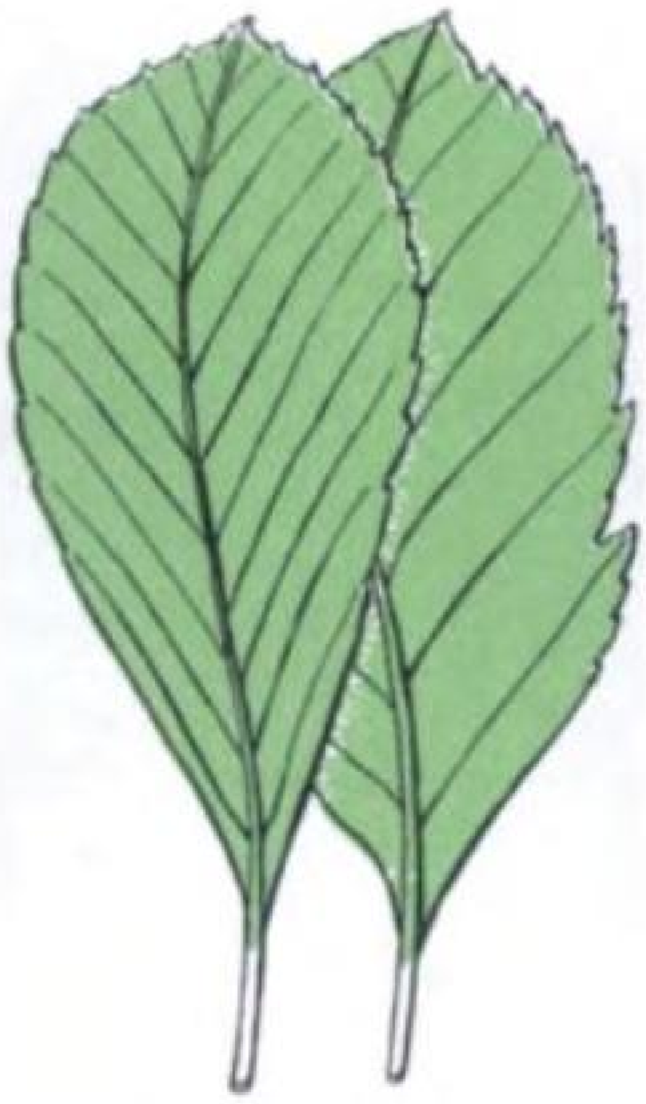
Flowers



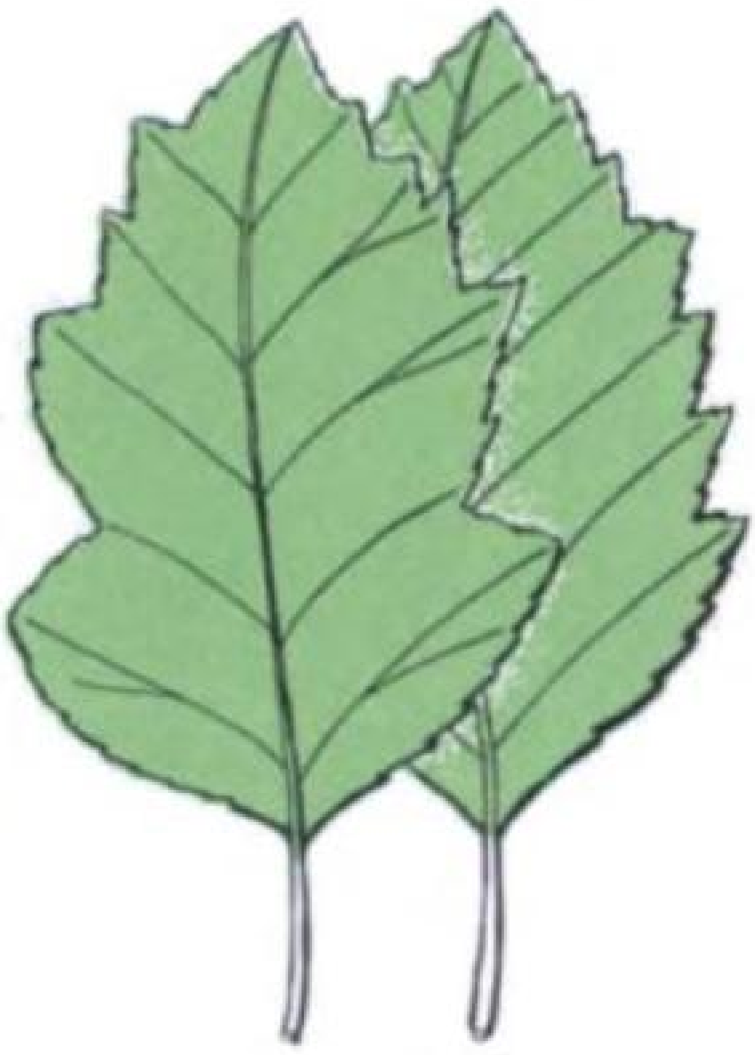
Fruit



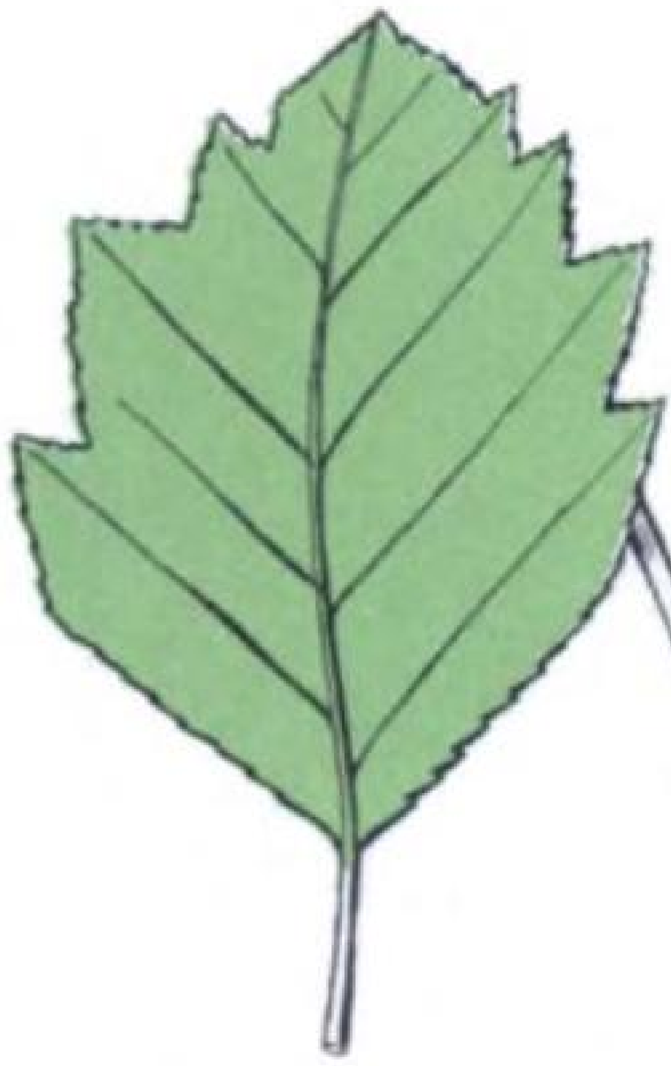
COCKSPUR



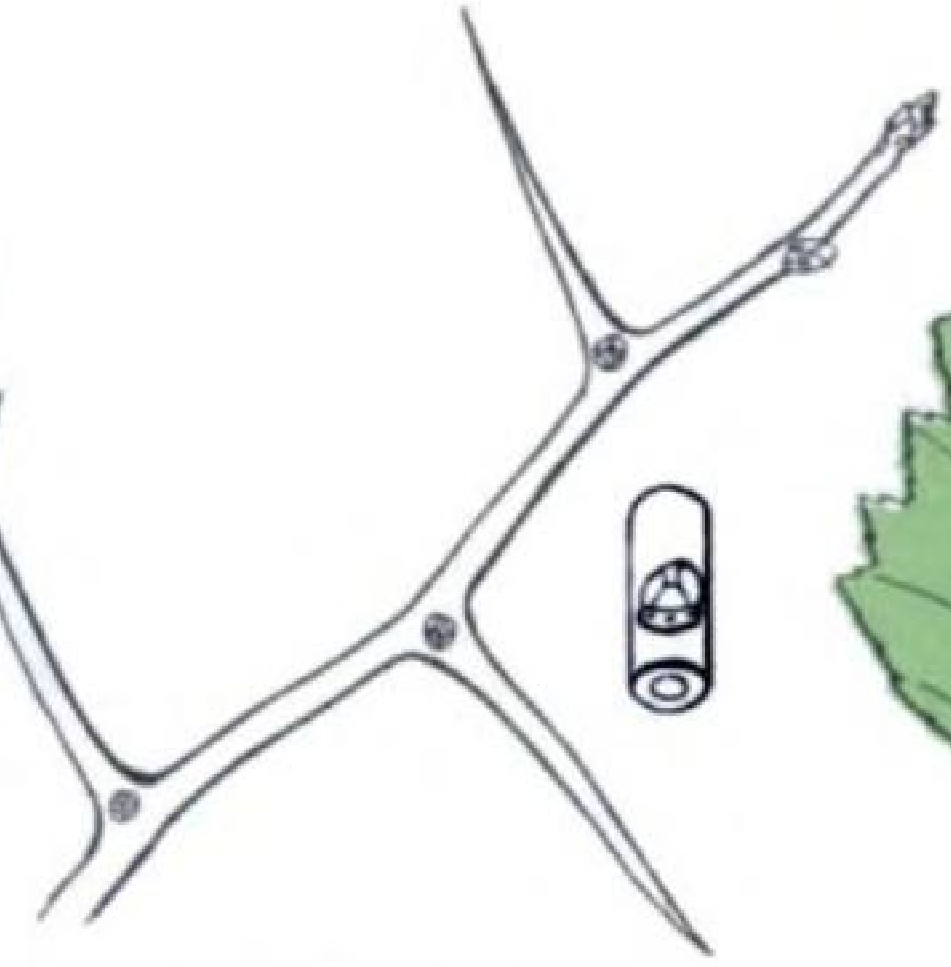
DOTTED



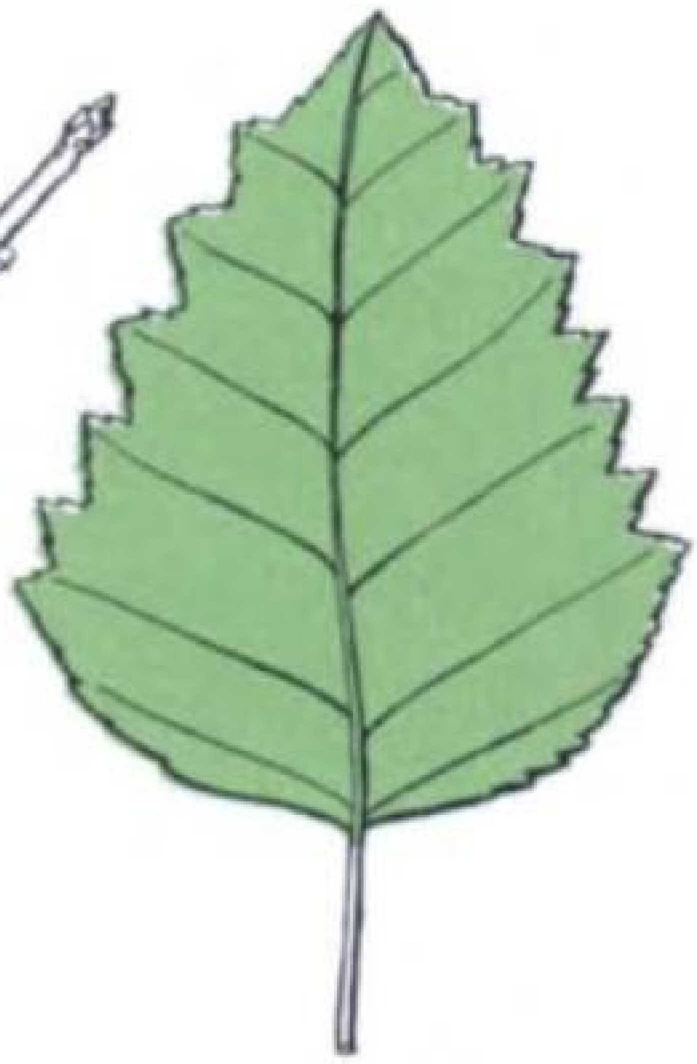
THICKET



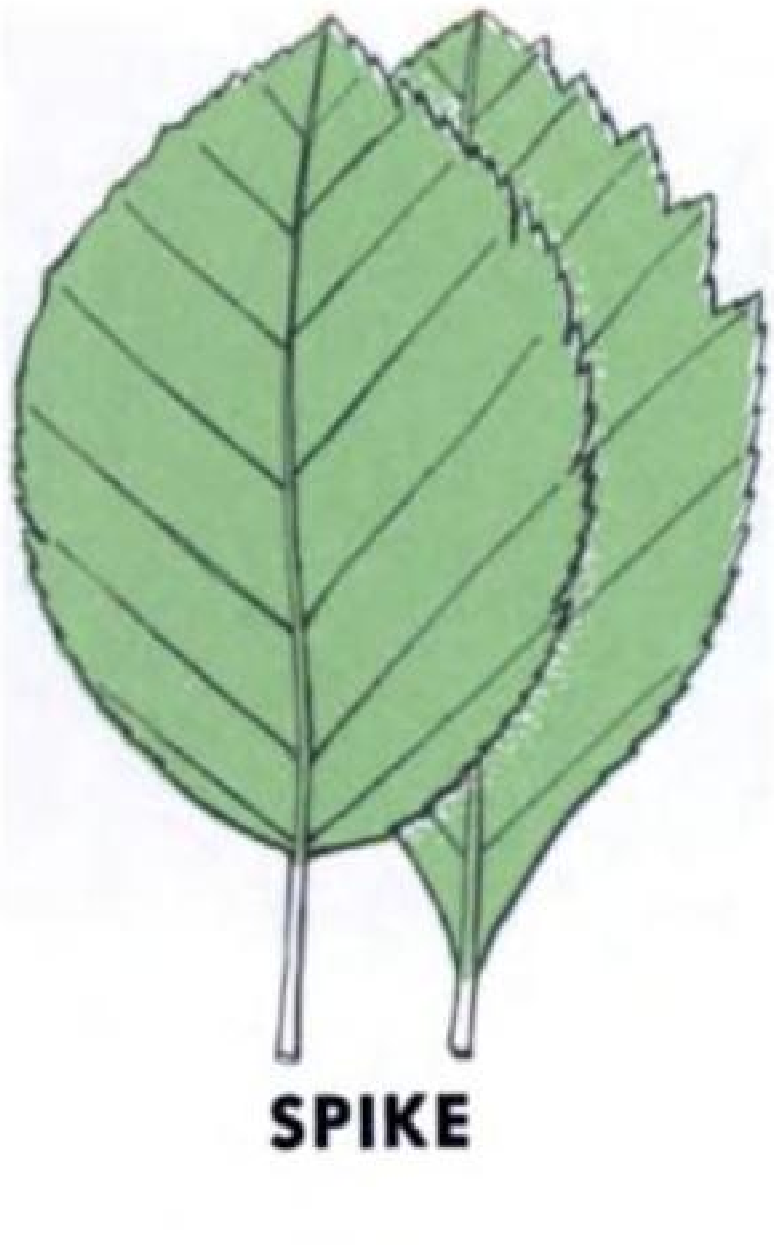
MARGARET



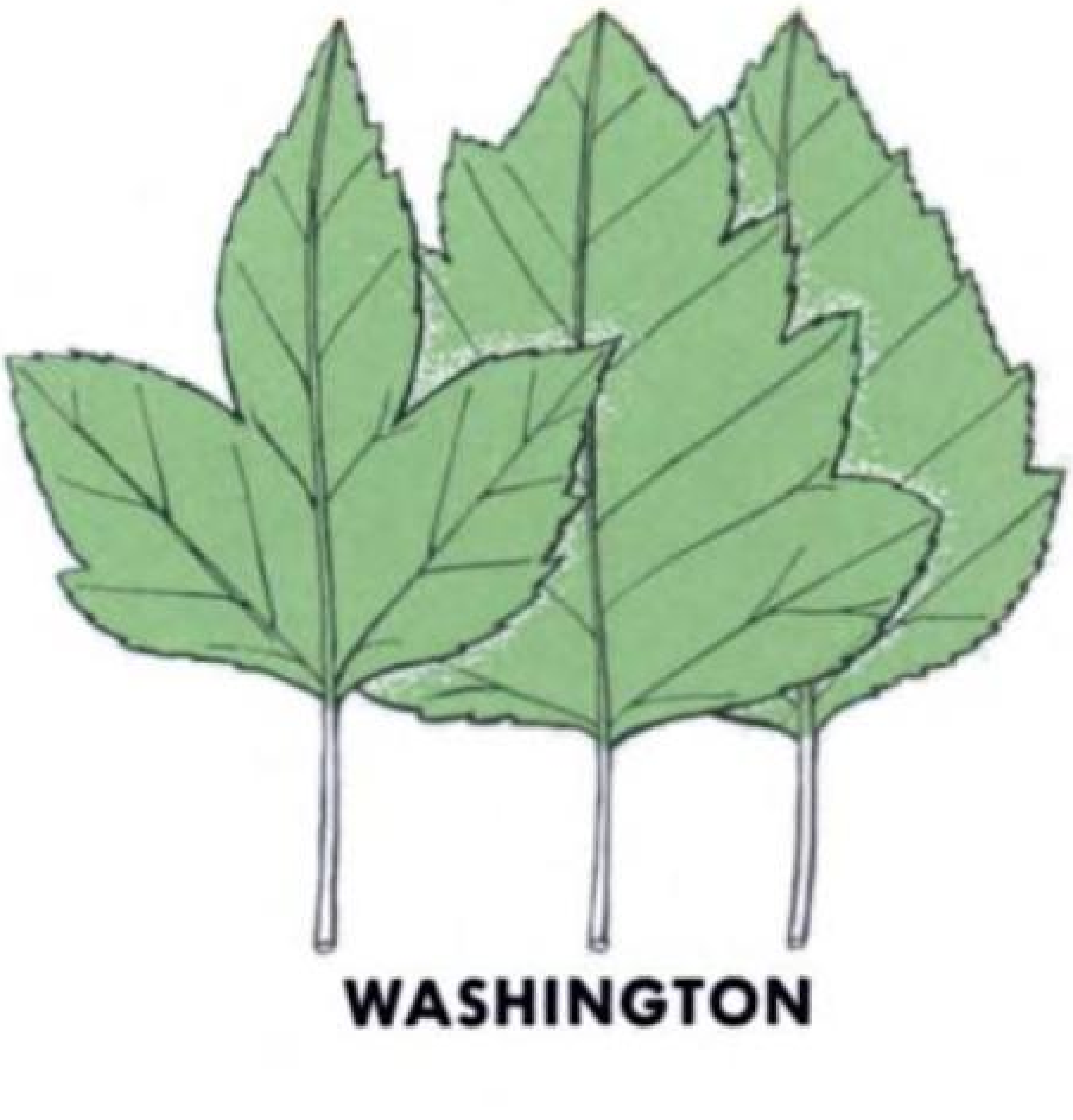
Winter twig of
HAWTHORN



FROSTED



SPIKE



WASHINGTON

THORNLESS CURRANTS

Low shrubs with alternate, fan-lobed leaves, which may be clustered on short "spur" branches.

V AMERICAN BLACK CURRANT, *Ribes americanum* p. 201
Floodplains and woods openings; w. New Brunswick and Alberta to Delaware, w. Virginia, Nebraska, and New Mexico.

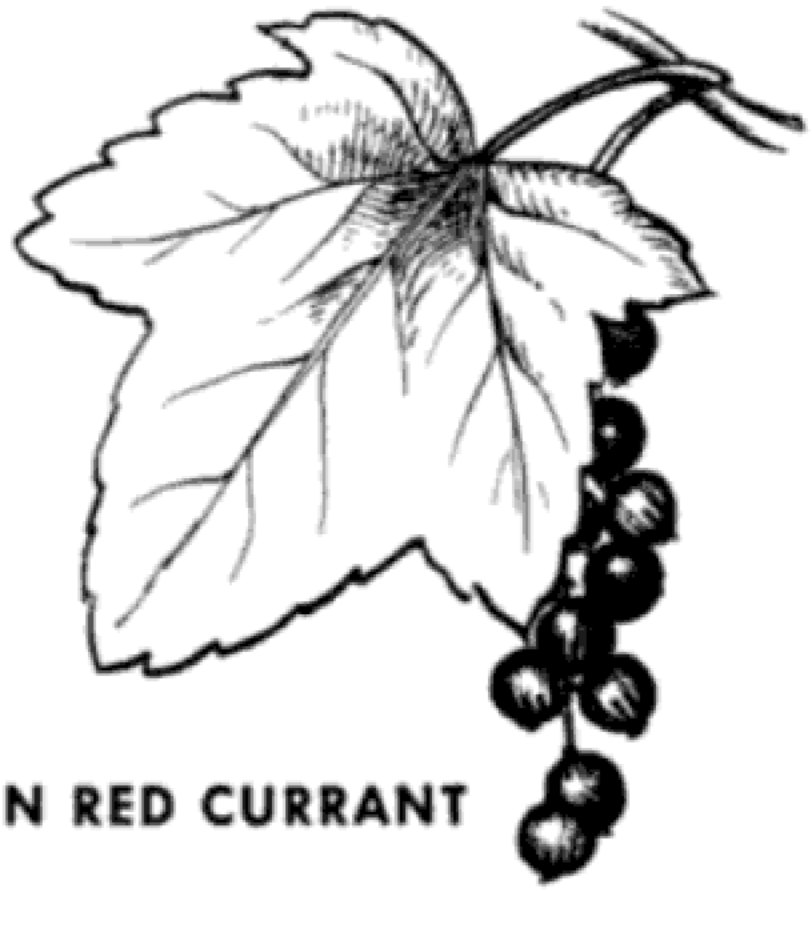
V EUROPEAN BLACK CURRANT, *Ribes nigrum* p. 201
Escaped from gardens; locally established in wild.
V CANADIAN BLACK CURRANT p. 201
R. hudsonianum (not illus.)

V GOLDEN CURRANT, *Ribes odoratum* p. 202
Rocky places; Minnesota and S. Dakota to Missouri, Arkansas, and Texas, but cultivated in the East.

V GARDEN RED CURRANT, *Ribes sativum* p. 202
Escaped from cultivation to fields and woods openings; throughout n. U.S. and s. Canada.

V SKUNK CURRANT, *Ribes glandulosum* p. 202
Low wet woods and boggy spots; Newfoundland, Labrador, Northwest Territories, and n. British Columbia to New England, New York, n. Ohio, Minnesota, and Saskatchewan; in Appalachians to N. Carolina.

V SWAMP RED CURRANT, *Ribes triste* p. 202
Swampy places; Newfoundland, s. Labrador, and Alaska to n. New Jersey, ne. Pennsylvania, w. New York, s. Ontario, Michigan, S. Dakota, and Oregon; in mts. to W. Virginia.



GARDEN RED CURRANT

MISCELLANEOUS PLANTS WITH FAN-LOBED LEAVES

With the currants, the only thornless species whose alternate leaves are all of this type. Mulberries and Sassafras (Plate 43) usually have some fan-lobed leaves.

↑ TULIP-TREE, *Liriodendron tulipifera* p. 203
Fertile woods; Massachusetts, s. Vermont, s. Ontario, s. Michigan, and s. Illinois, to centr. Florida, Louisiana, and e. Arkansas.

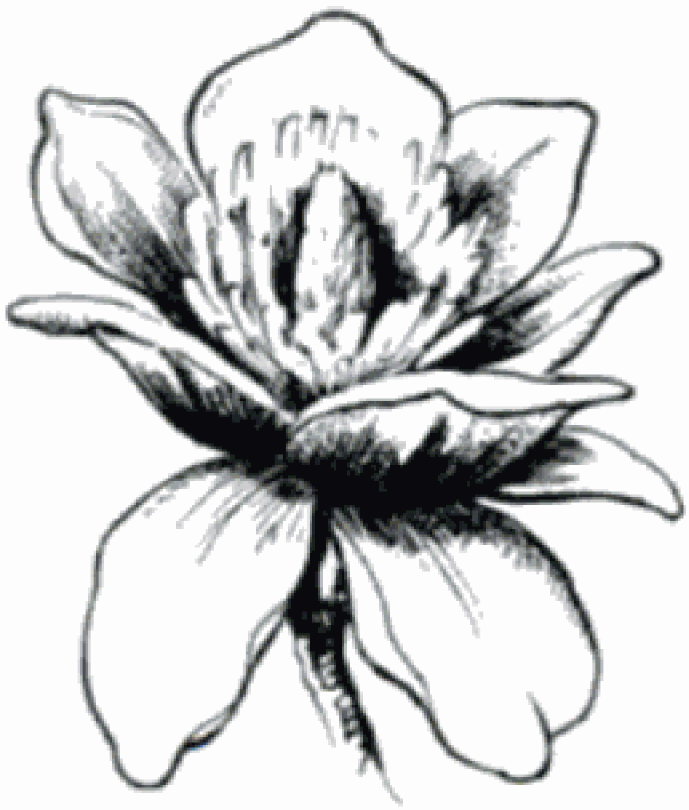
↑ SWEETGUM, *Liquidambar styraciflua* p. 203
Wet woods; s. Connecticut, se. New York, W. Virginia, s. Ohio, s. Illinois, se. Missouri, and se. Oklahoma to centr. Florida and e. Texas.

↑ SYCAMORE, *Platanus occidentalis* p. 204
Streambanks and bottomlands; sw. Maine, New York, s. Ontario, centr. Michigan, Iowa, and e. Nebraska to nw. Florida and centr. Texas.

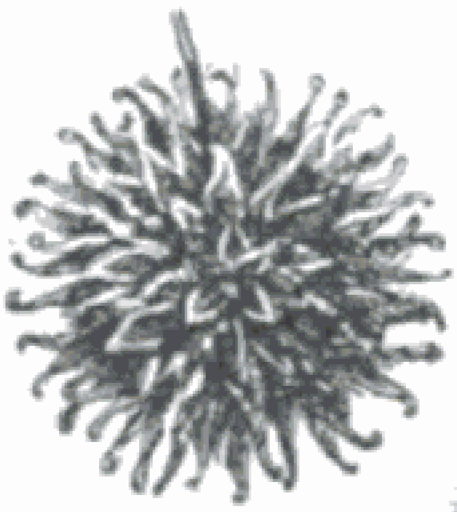
ѱ ROSE-OF-SHARON, *Hibiscus syriacus* p. 205
Roadsides and thickets; an escape; Connecticut, New York, Ohio, and Missouri to Florida and Texas.

ѱ FLOWERING RASPBERRY, *Rubus odoratus* p. 205
Openings and fields; Nova Scotia, s. Quebec, and s. Ontario to Long Island, Georgia, and Tennessee.
  ѱ THIMBLEBERRY, *R. parviflorus* (not illus.) p. 205

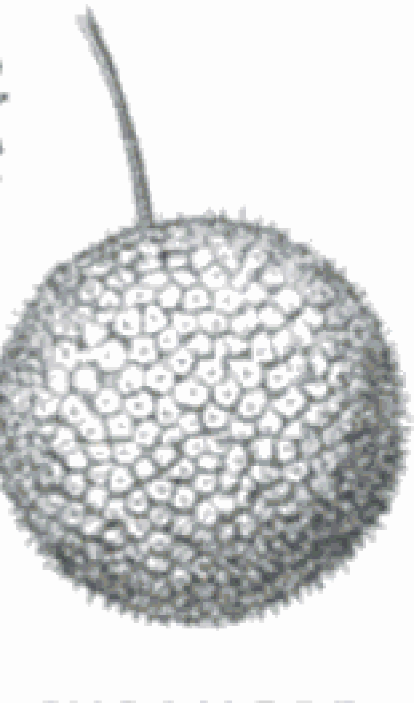
ѱ NINEBARK, *Physocarpus opulifolius* p. 205
Open areas; Quebec, n. Ontario, Minnesota, and Colorado to S. Carolina, Tennessee, and Arkansas.



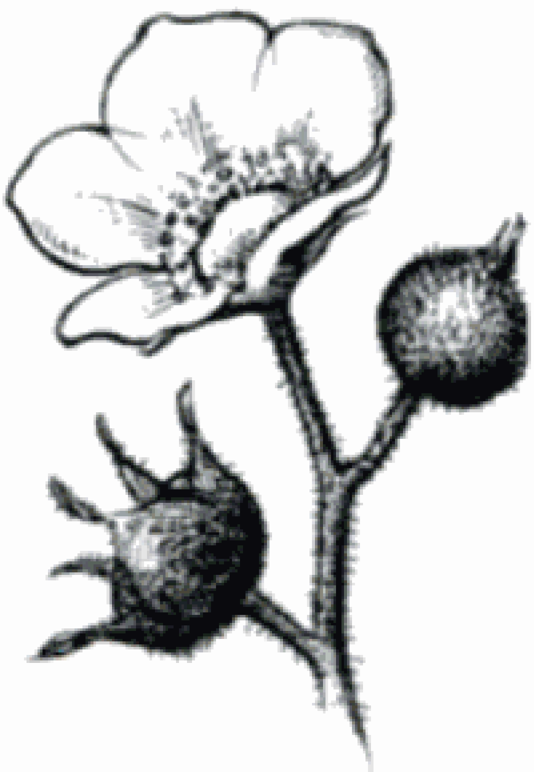
TULIP-TREE



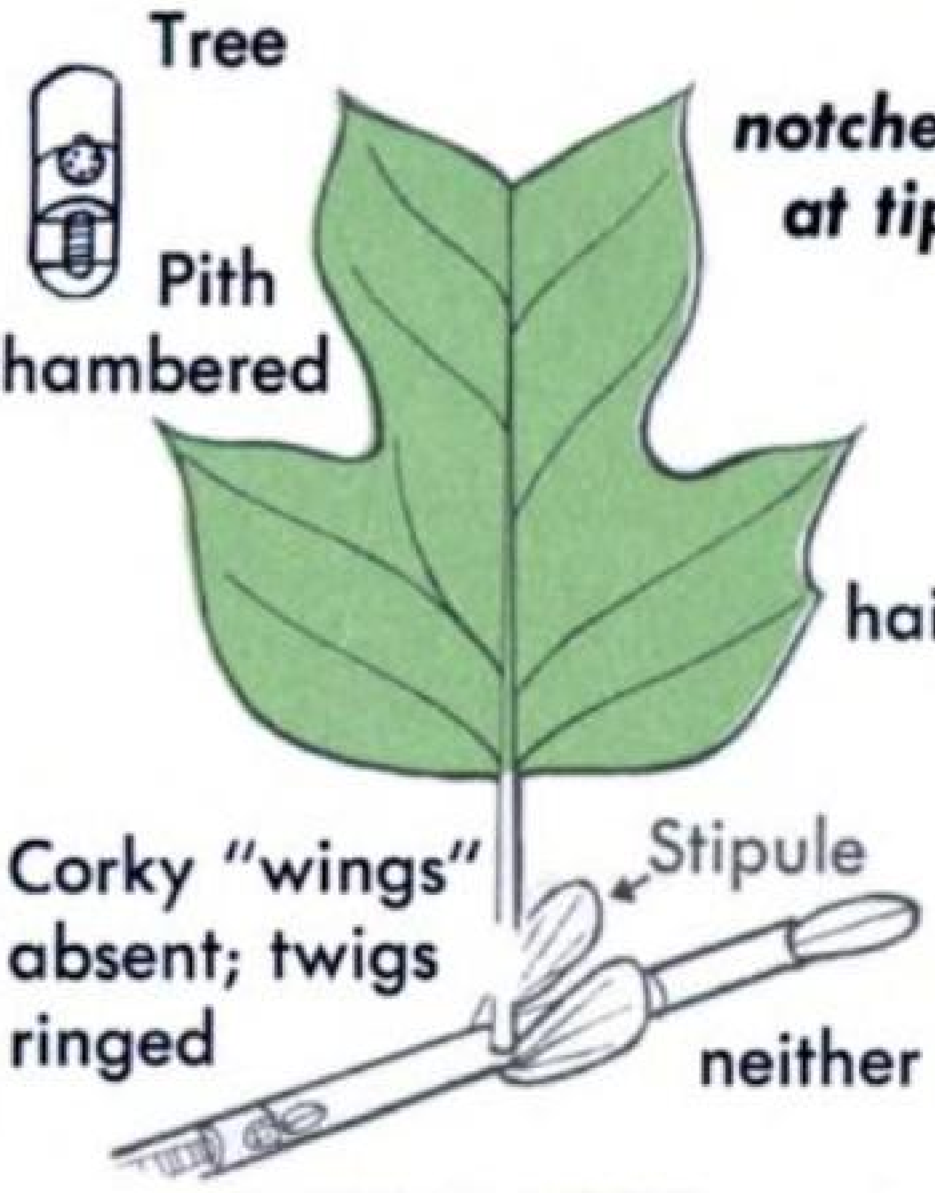
SWEETGUM
(fruit head)

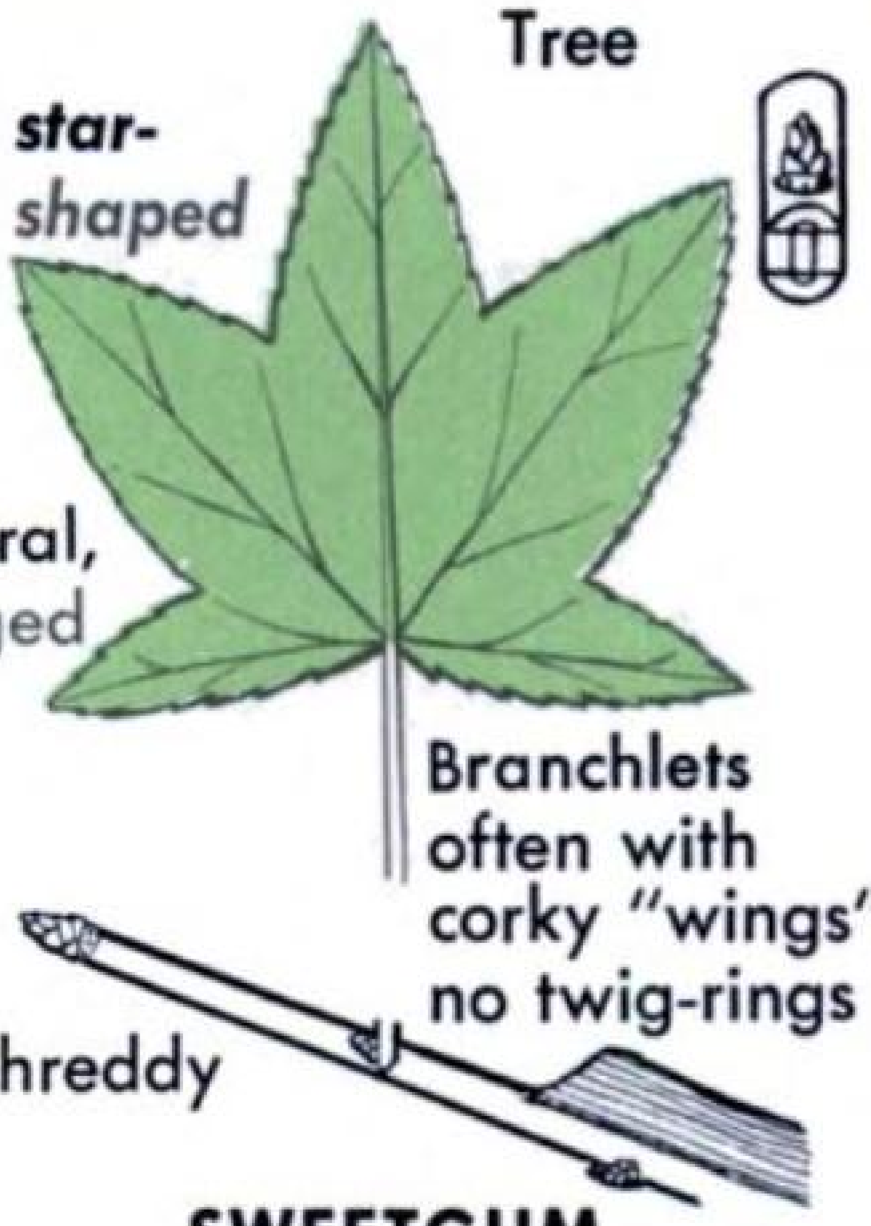


SYCAMORE
(fruits)

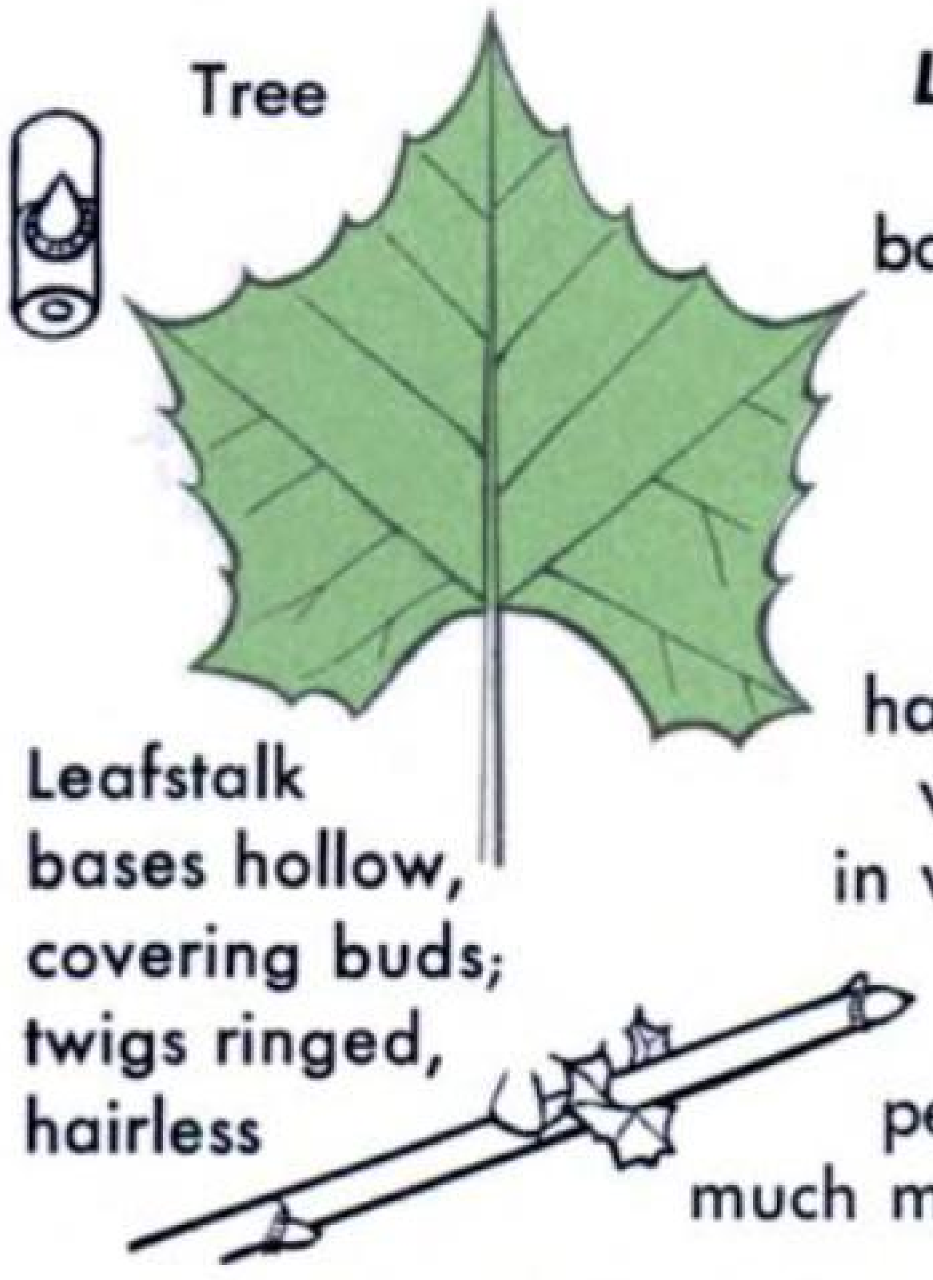


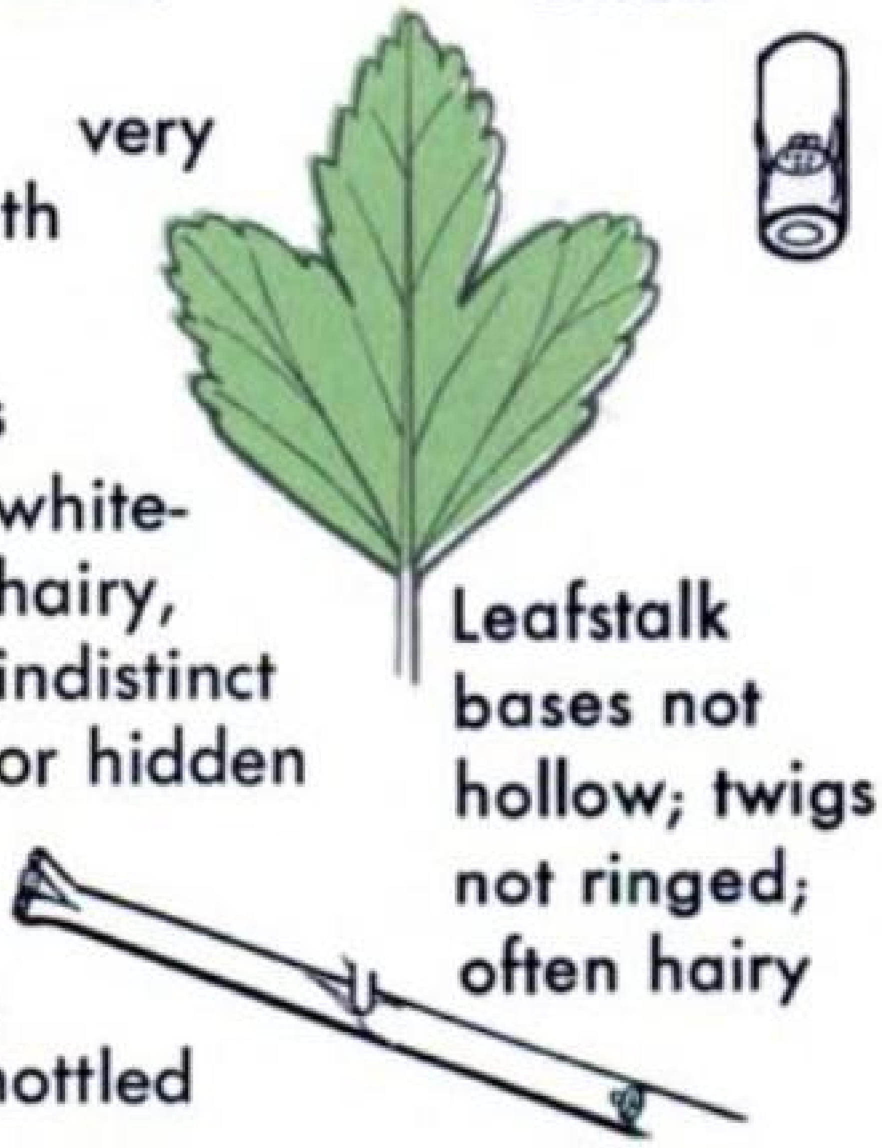
FLOWERING
RASPBERRY



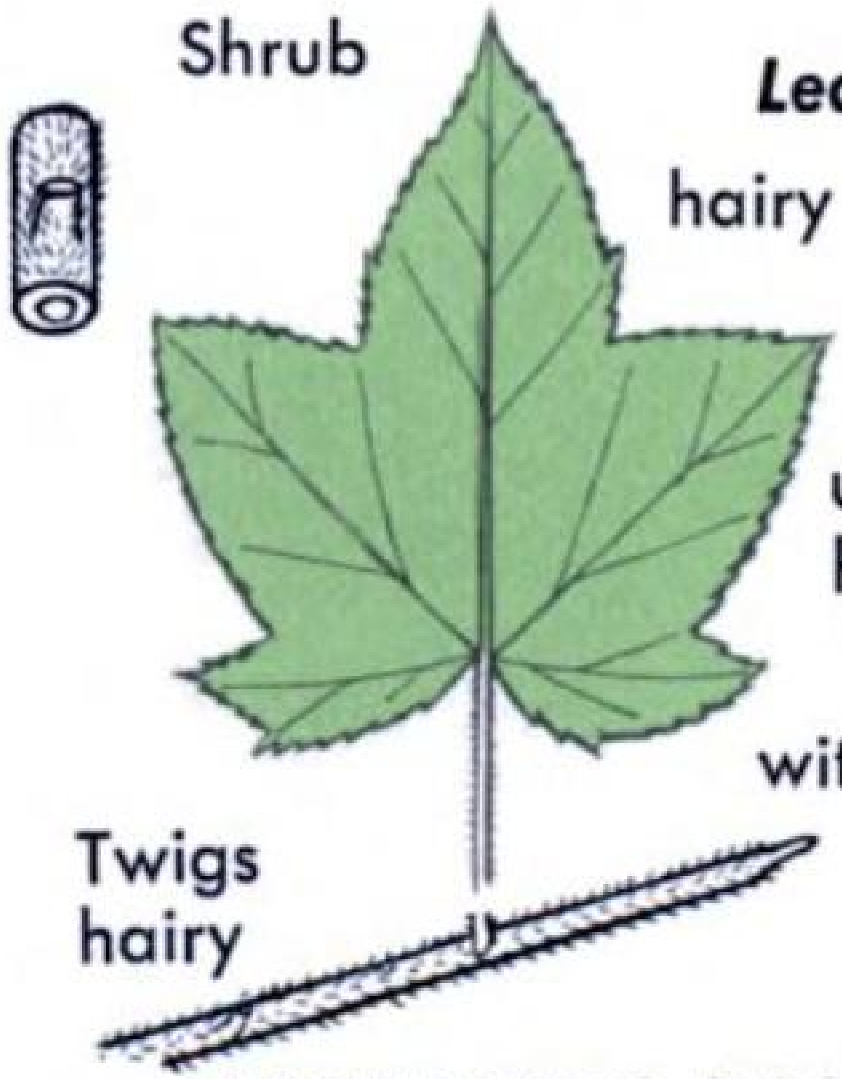


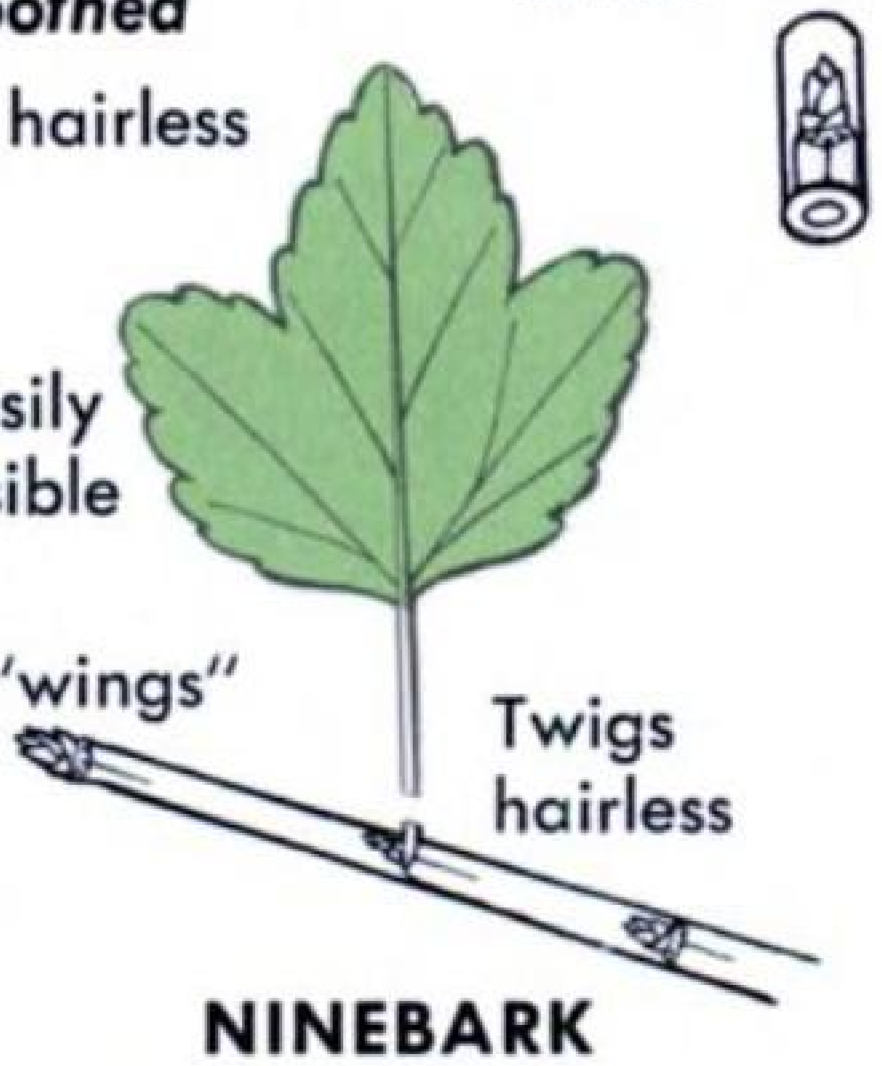
	TULIP-TREE	SWEETGUM
	Tree	Tree
	Pith chambered	
Leaves	***notched at tip***	***star-shaped***
Bud scales	2, hairless	several, fringed
	Corky "wings" absent; twigs ringed	Branchlets often with corky "wings"; no twig-rings
Older bark	neither peeling nor shreddy	





	SYCAMORE	ROSE-OF-SHARON
	Tree	Shrub
Leaves 3- to 5-lobed, toothed		
hairy beneath	barely	very
Bud scales	1, hairless, visible in winter	white-hairy, indistinct or hidden
	Leafstalk bases hollow, covering buds; twigs ringed, hairless	Leafstalk bases not hollow; twigs not ringed; often hairy
Older bark	peeling, much mottled	close, not mottled





	FLOWERING RASPBERRY	NINEBARK
	Shrub	Shrub
Leaves 3- to 5-lobed, toothed	hairy beneath	hairless
Buds	usually hidden	easily visible
Twigs	without rings or corky "wings"	
	Twigs hairy	Twigs hairless
Older bark	papery, shreddy	

LEAVES FAN-LOBED OR FAN-VEINED

Plants whose leaves have 3–5 main veins meeting near their bases. Unlobed leaves mostly heart-shaped or triangular.

Note: The sap of the leafstalks and twigs of the 3 mulberries is *milky;* that of the others is clear.

↟ PAPER-MULBERRY, *Broussonetia papyrifera* p. 206
Thickets and young woods; s. New England, Missouri, and se. Kansas to Florida and s. Texas.

↟ RED MULBERRY, *Morus rubra* p. 206
Fertile soils; Massachusetts, sw. Vermont, New York, s. Ontario, se. Minnesota, and se. Nebraska to s. Florida and centr. Texas.

↟ WHITE MULBERRY, *Morus alba* p. 207
Rich soils; Maine and Ontario to Florida and Texas.

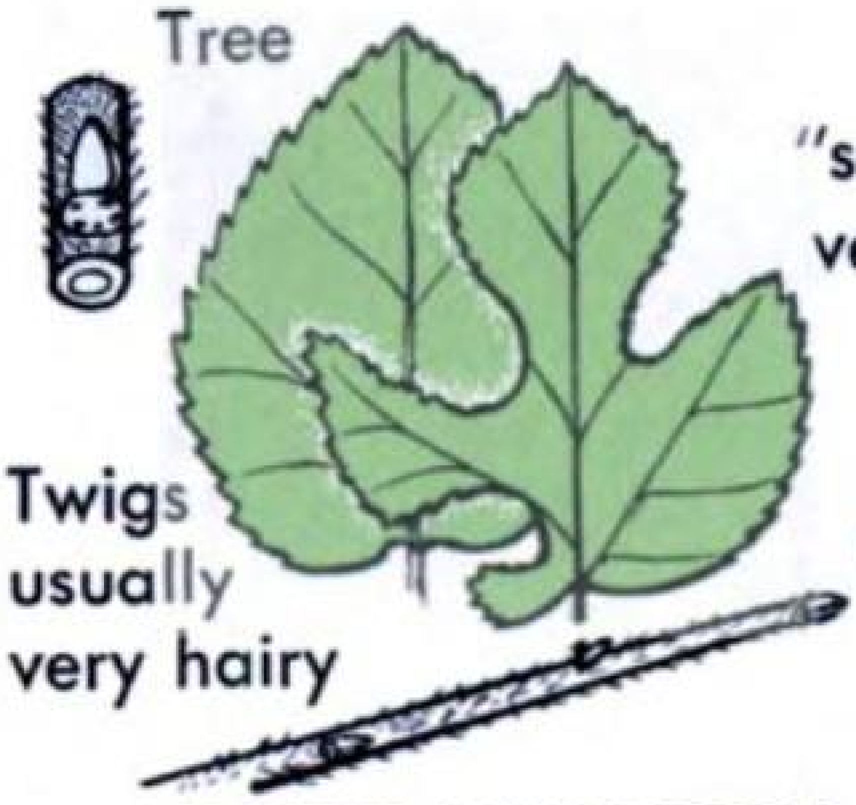
↟ AMERICAN BASSWOOD, *Tilia americana* p. 207
Moist woods; New Brunswick, s. Quebec, and Manitoba to Florida and Texas.
- ↟ FLORIDA BASSWOOD, *T. floridana* (not illus.) p. 207
- ↟ HOARY BASSWOOD, *T. neglecta* (not illus.) p. 207
- ↟ WHITE BASSWOOD, *T. heterophylla* (not illus.) p. 207

↟ SASSAFRAS, *Sassafras albidum* p. 208
Old fields and woods; sw. Maine, s. Vermont, New York, s. Ontario, centr. Michigan, and se. Iowa to centr. Florida and e. Texas.

↟ REDBUD, *Cercis canadensis* p. 208
Fertile woods; Connecticut, s. New York, s. Ontario, s. Wisconsin, and s. Nebraska to n. Florida and w. Texas.

↟ AMERICAN HACKBERRY, *Celtis occidentalis* p. 209
Woods and open places; more common southward, sw. Quebec and Idaho to n. Florida, Arkansas, Oklahoma, and Utah.
- ↟ UPLAND HACKBERRY, *C. tenuifolia* (not illus.) p. 209
- ↟ LOWLAND HACKBERRY, *C. laevigata* (not illus.) p. 209

Ѱ NEW JERSEY TEA, *Ceanothus americanus* p. 209
Dry, open woods; centr. Maine, s. Quebec, and s. Manitoba to Florida and Texas.
- Ѱ REDROOT, *C. ovatus* (leaf illus.) p. 210
- Ѱ WILD-LILAC, *C. sanguineus* (not illus.) p. 210


Tree

Twigs usually very hairy

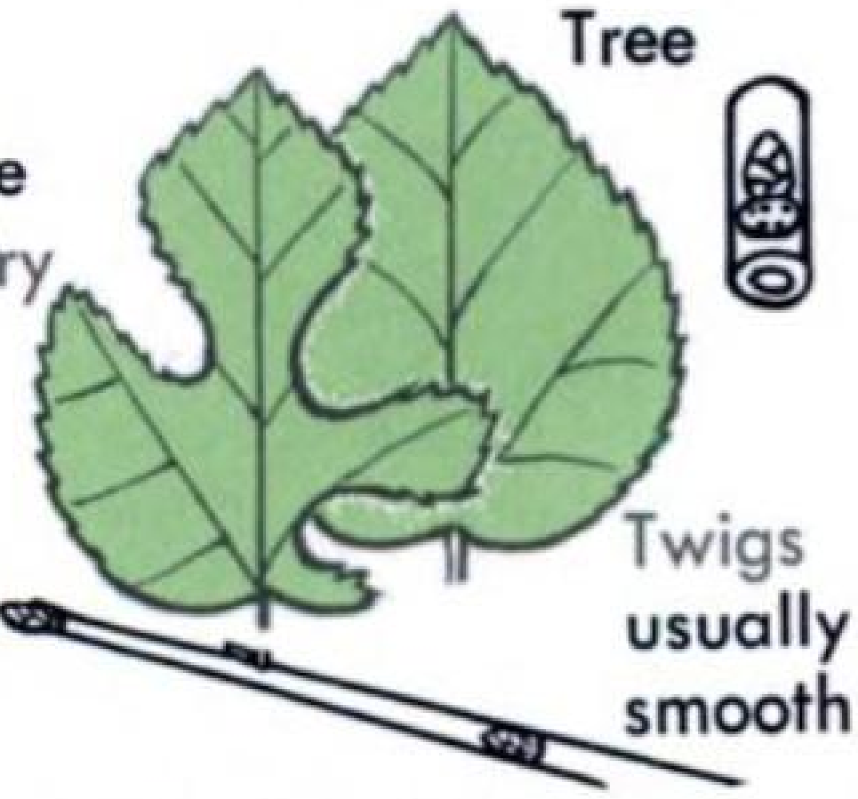
PAPER-MULBERRY

Leaves toothed; often lobed

"sandpapery" above velvety beneath / hairy beneath

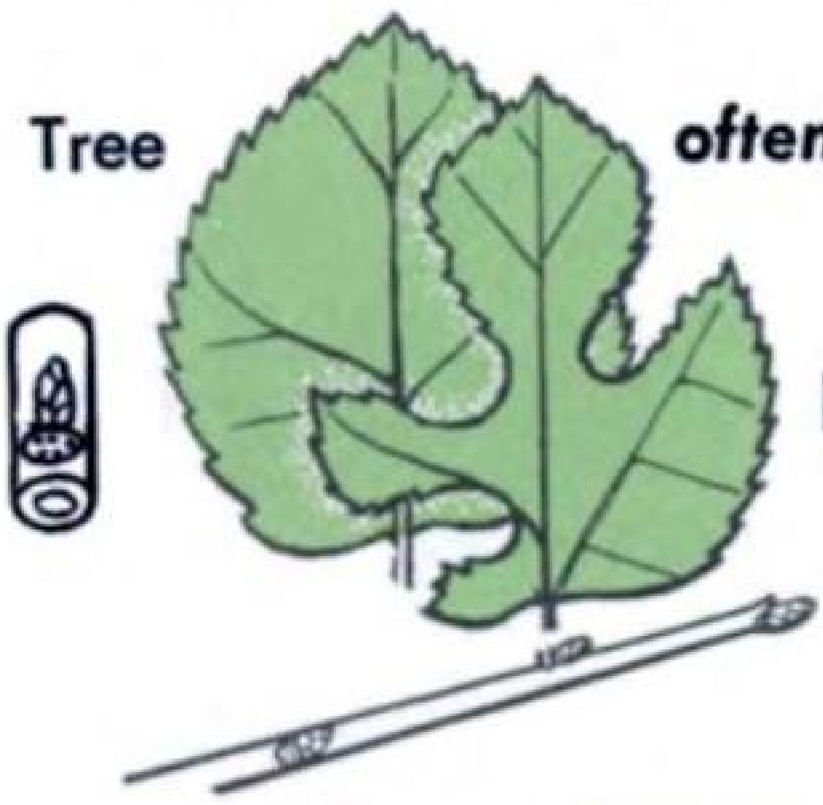
Leaf bases uneven / even

End buds false


Tree

Twigs usually smooth

RED MULBERRY


Tree

WHITE MULBERRY

Leaves toothed

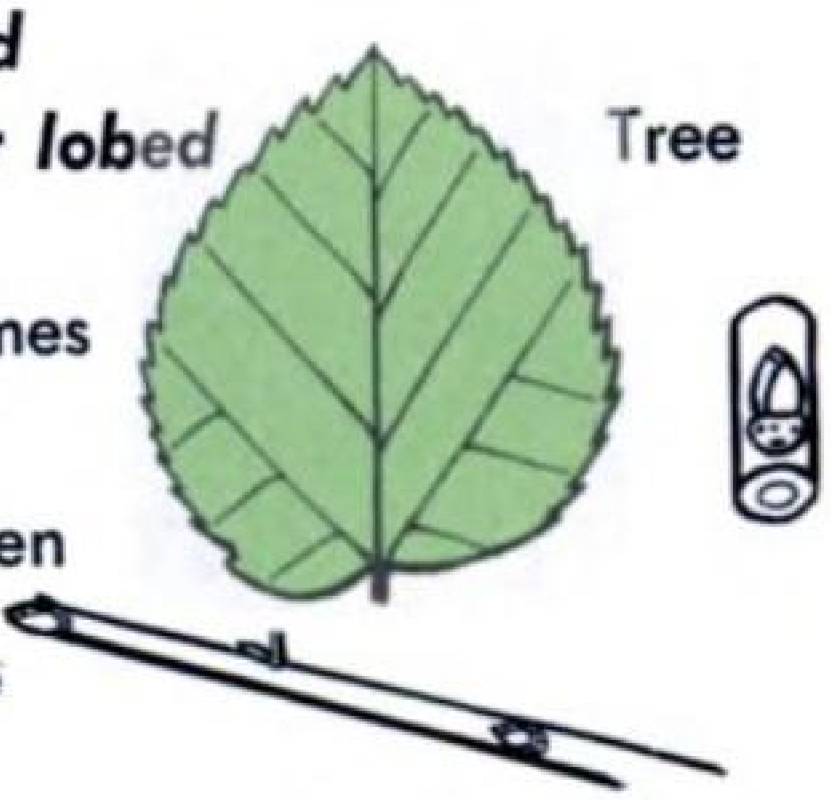
often lobed / ***never lobed***

Undersides

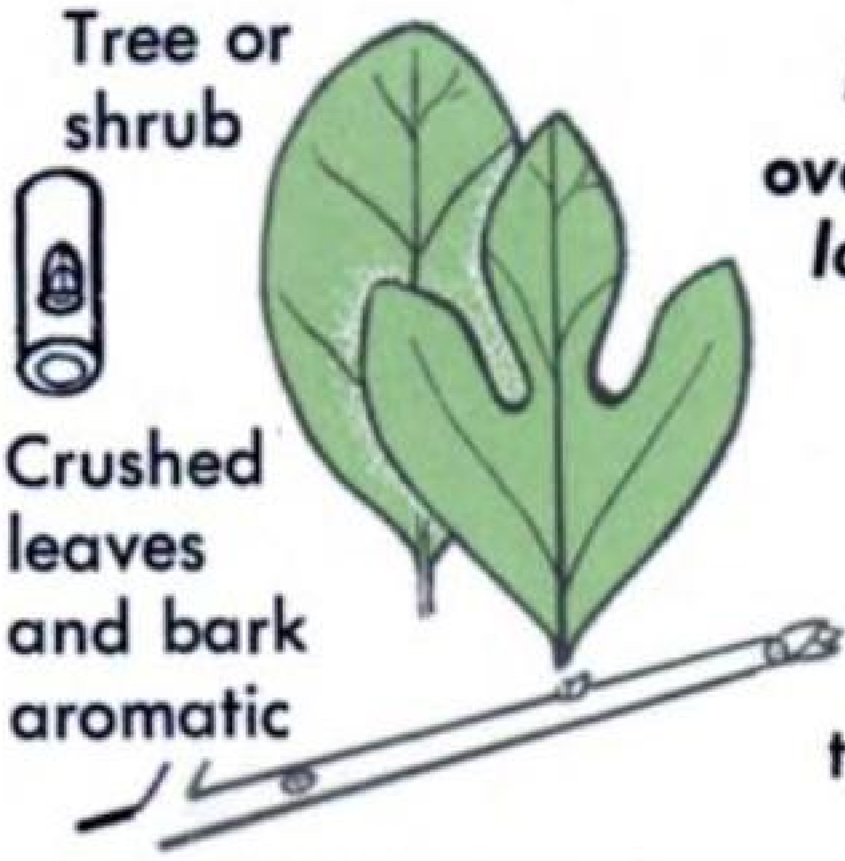
not hairy / sometimes hairy

Leaf bases uneven

End buds false


Tree

AMERICAN BASSWOOD


Tree or shrub

Crushed leaves and bark aromatic

SASSAFRAS

Leaves not toothed

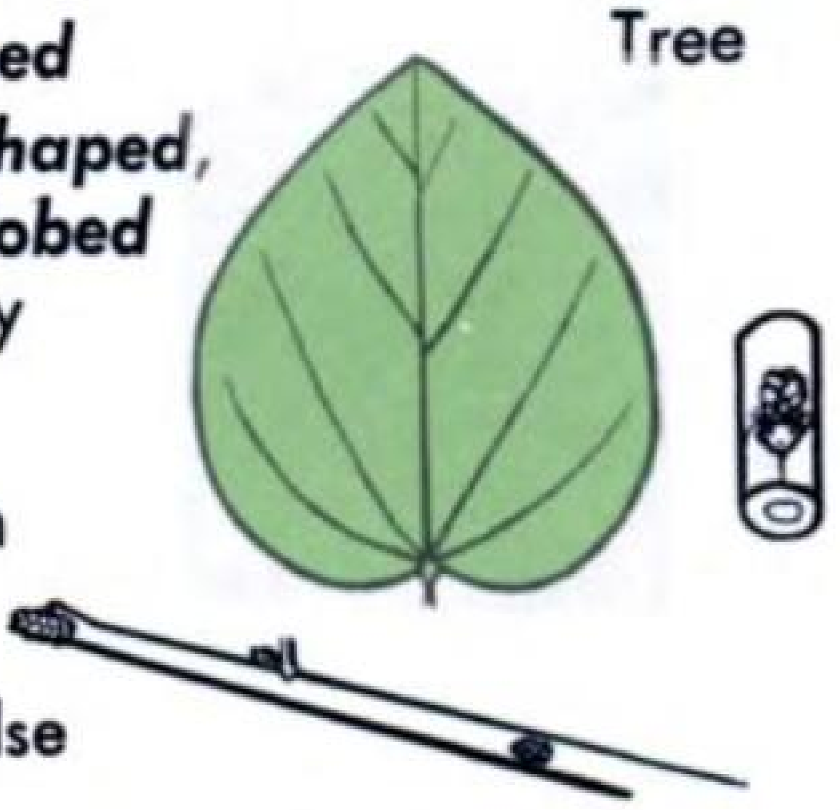
oval or lobed / ***heart-shaped, never lobed***

smooth or hairy

Leaf bases even

End buds

true / false


Tree

REDBUD

Leaves toothed, never lobed

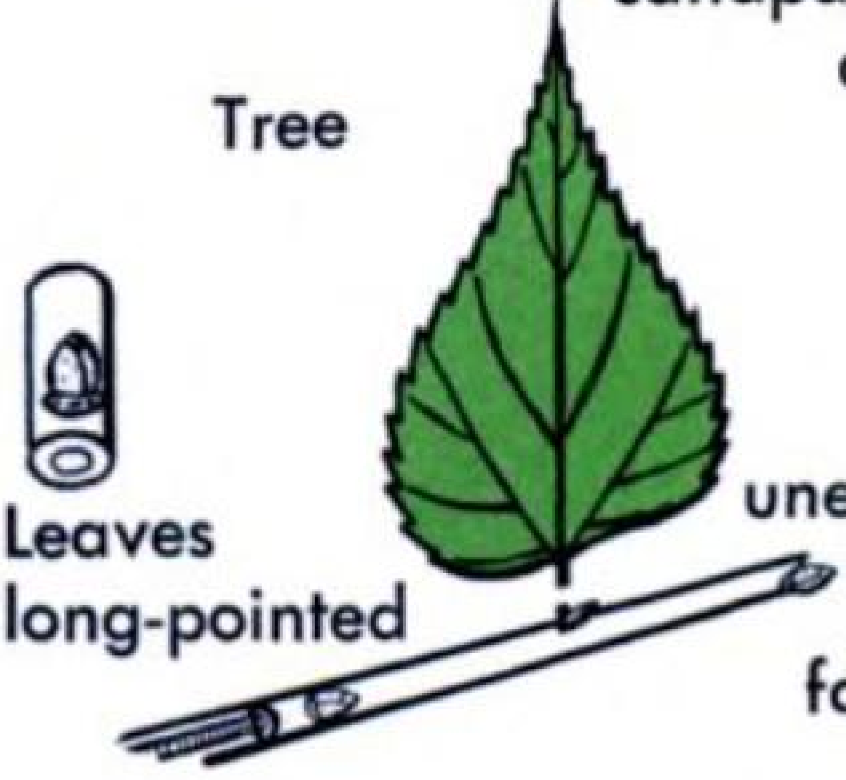
"sandpapery" above / smooth above, hairy beneath

Leaf bases

uneven / even

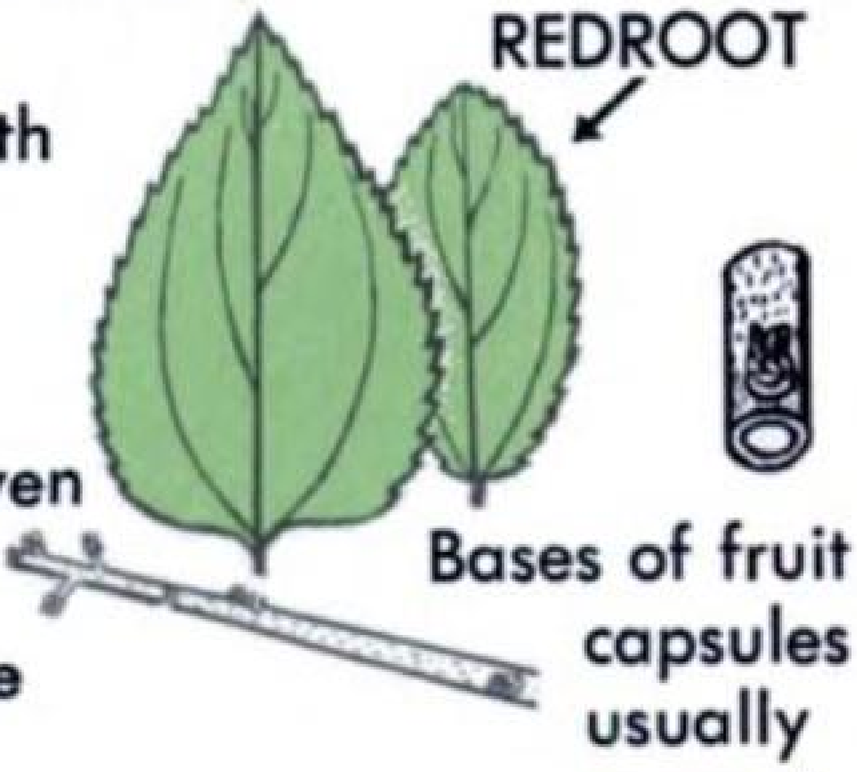
End buds

false / true


Tree

Leaves long-pointed

AMERICAN HACKBERRY


Small shrubs

REDROOT

Bases of fruit capsules usually present

NEW JERSEY TEA

OAKS (1) — LEAVES LOBED WITHOUT BRISTLE-TIPS

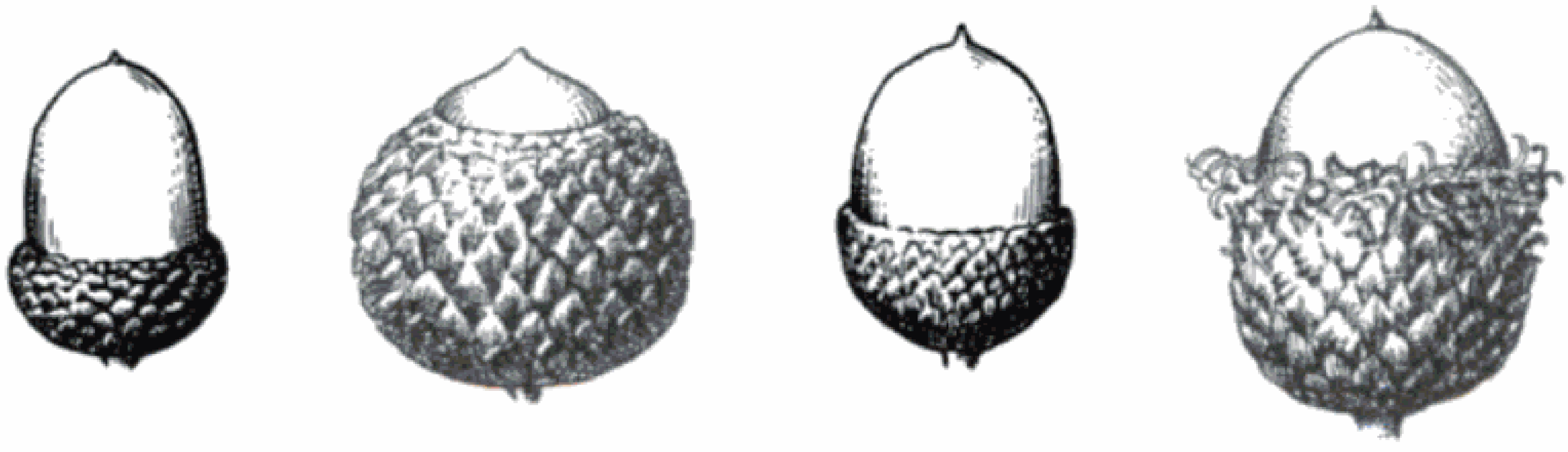
Only oaks have leaves of this "feather-lobed" type, but not all oaks have such leaves (see Plates 47 and 48). Buds are clustered at tips of twigs. Oaks usually can be identified by differences in leaf shapes. bud types, and acorns. In winter, and when in doubt, consult the text.

▲ WHITE OAK, *Quercus alba* p. 216
Dry or moist woods; centr. Maine, s. Quebec, s. Ontario, and Minnesota to nw. Florida and e. Texas.

▲ OVERCUP OAK, *Quercus lyrata* p. 216
Coastal Plain swamp forests; s. New Jersey to n. Florida, west to e. Texas, and north in the Mississippi drainage to sw. Indiana, s. Illinois, se. Missouri, and se. Oklahoma.

▲ POST OAK, *Quercus stellata* p. 216
Dry soils; se. Massachusetts, se. New York, se. Pennsylvania, W. Virginia, centr. Ohio, s. Indiana, s. Iowa, and w. Oklahoma to centr. Florida and centr. Texas.

▲ MOSSYCUP OAK (BUR OAK), *Quercus macrocarpa* p. 217
Rich woods, prairie borders; New Brunswick, s. Quebec, s. Ontario, n. Michigan, and se. Saskatchewan to w. New England, Maryland, W. Virginia, Alabama, and centr. Texas.

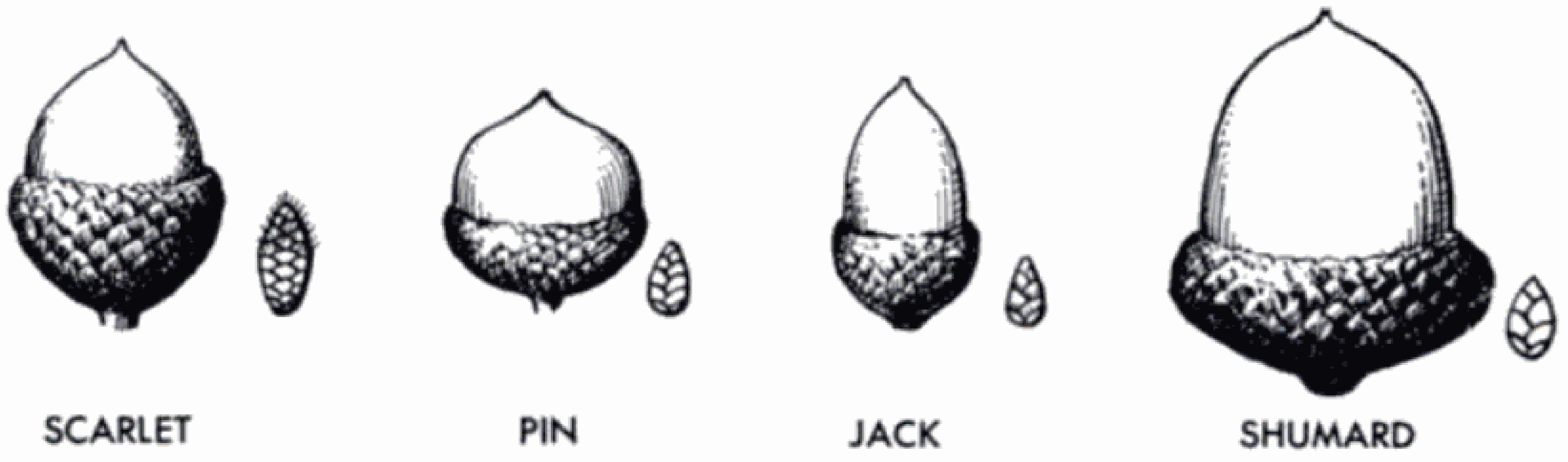


WHITE OVERCUP POST MOSSYCUP

ACORNS

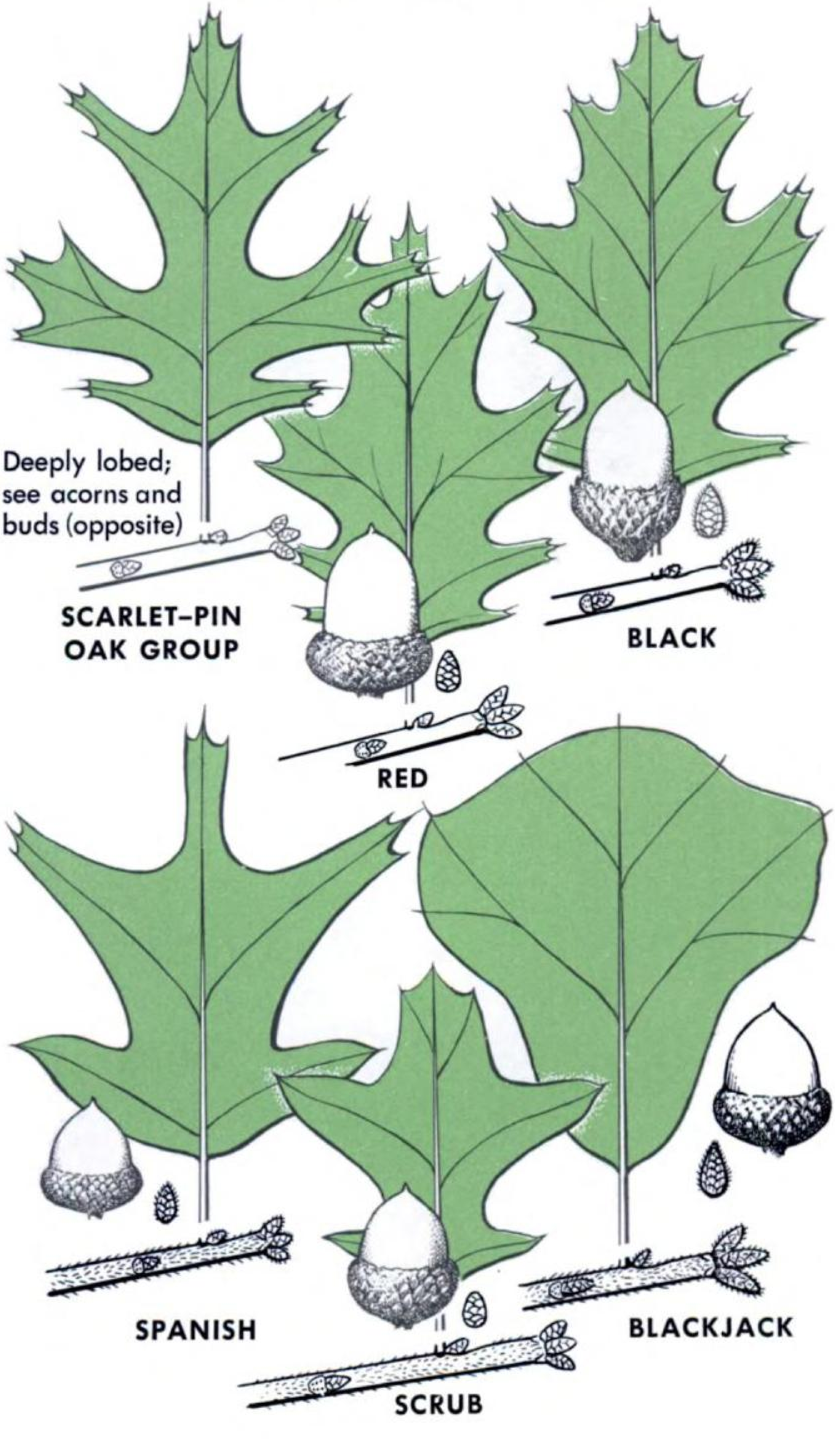
OAKS (2) — LEAVES LOBED WITH BRISTLE-TIPS

- SCARLET–PIN OAK GROUP (see acorns and buds below)
  - SCARLET OAK, *Quercus coccinea* p. 217
    Dry soils; sw. Maine, s. Ontario, s. Michigan, and se. Missouri to nw. New Jersey, w. Maryland, n. Georgia, n. Mississippi, and ne. Arkansas.
  - PIN OAK, *Q. palustris* p. 217
    Bottomlands and moist woods; centr. Massachusetts, se. New York, s. Ontario, s. Michigan, se. Iowa, and e. Kansas to N. Carolina, Tennessee, and ne. Oklahoma.
  - JACK OAK, *Q. ellipsoidalis* p. 217
    Dry soils; n. Ohio, centr. Michigan, and s. Manitoba to n. Indiana, n. Missouri, and Iowa.
  - NUTTALL OAK, *Q. nuttallii* p. 218
    Low woods; w. Tennessee, se. Missouri, and se. Oklahoma to Alabama and e. Texas.
  - SHUMARD OAK, *Q. shumardii* p. 218
    Bottomlands and moist soils, mostly Coastal Plain; s. Pennsylvania, nw. Ohio, and se. Kansas to n. Florida and centr. Texas.
- BLACK OAK, *Quercus velutina* p. 218
  Dry soils; s. Maine, New York, s. Ontario, s. Minnesota, and se. Nebraska to nw. Florida and e. Texas.
- RED OAK, *Quercus rubra* p. 218
  Woods; Nova Scotia, s. Quebec, n. Michigan, n. Minnesota, and e. Nebraska to Georgia and se. Oklahoma.
- SPANISH OAK, *Quercus falcata* p. 219
  Woods; se. New York, s. Ohio, s. Illinois, and s. Missouri to n. Florida and e. Texas.
  - TURKEY OAK, *Q. laevis* (not illus.) p. 219
- BLACKJACK OAK, *Quercus marilandica* p. 219
  Dry barren soils; se. New York, New Jersey, s. Michigan, and s. Iowa to ne. Florida and centr. Texas.
- SCRUB OAK, *Quercus ilicifolia* p. 219
  Dry slopes; se. Maine and New York to Maryland, w. N Carolina, and W. Virginia.



ACORNS AND BUDS OF SCARLET–PIN OAK GROUP

LEAVES LOBED WITH BRISTLE-TIPS


SCARLET–PIN
OAK GROUP
BLACK
RED
SPANISH
BLACKJACK
SCRUB

Deeply lobed;
see acorns and
buds (opposite)

OAKS (3) — LEAVES TOOTHED OR WAVY-EDGED

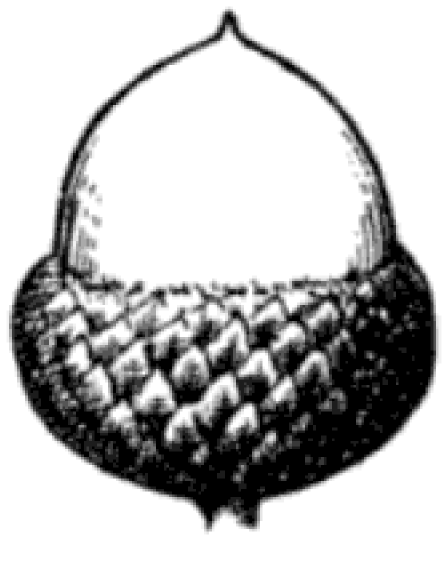
↑ SWAMP OAK, *Quercus bicolor* p. 220
Low woods; sw. Maine, sw. Quebec, s. Ontario, and se. Minnesota to Maryland, n. Virginia, w. N. Carolina, Tennessee, and Arkansas.

↑ CHESTNUT OAK, *Quercus prinus* p. 220
Dry woods; sw. Maine, New York, and s. Ontario to se. Virginia, nw. Georgia, n. Alabama, ne. Mississippi, and s. Illinois.

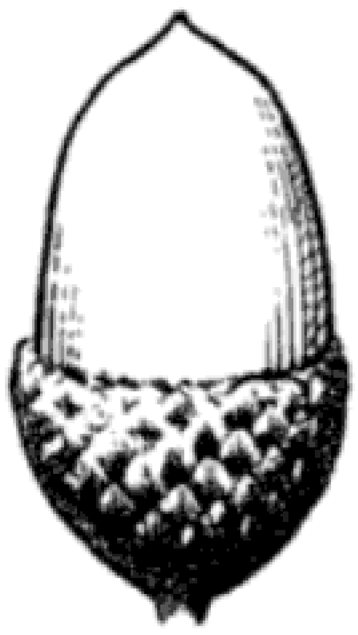
↑ BASKET OAK, *Q. michauxii* (leaf edge illus.) p. 220

↑ CHINQUAPIN OAK, *Quercus muehlenbergii* p. 220
Dry woods especially on limestone soils; Connecticut, nw. Vermont, s. Ontario, s. Wisconsin, and se. Nebraska to nw. Florida, centr. Texas, and ne. New Mexico.

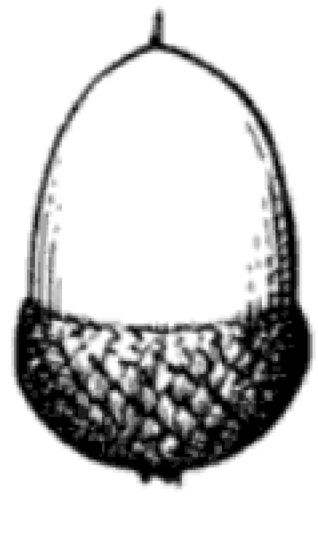
Ѱ DWARF OAK, *Quercus prinoides* p. 221
Dry barrens; sw. Maine, Minnesota, and Nebraska to se. Virginia, Alabama, and Texas.



SWAMP



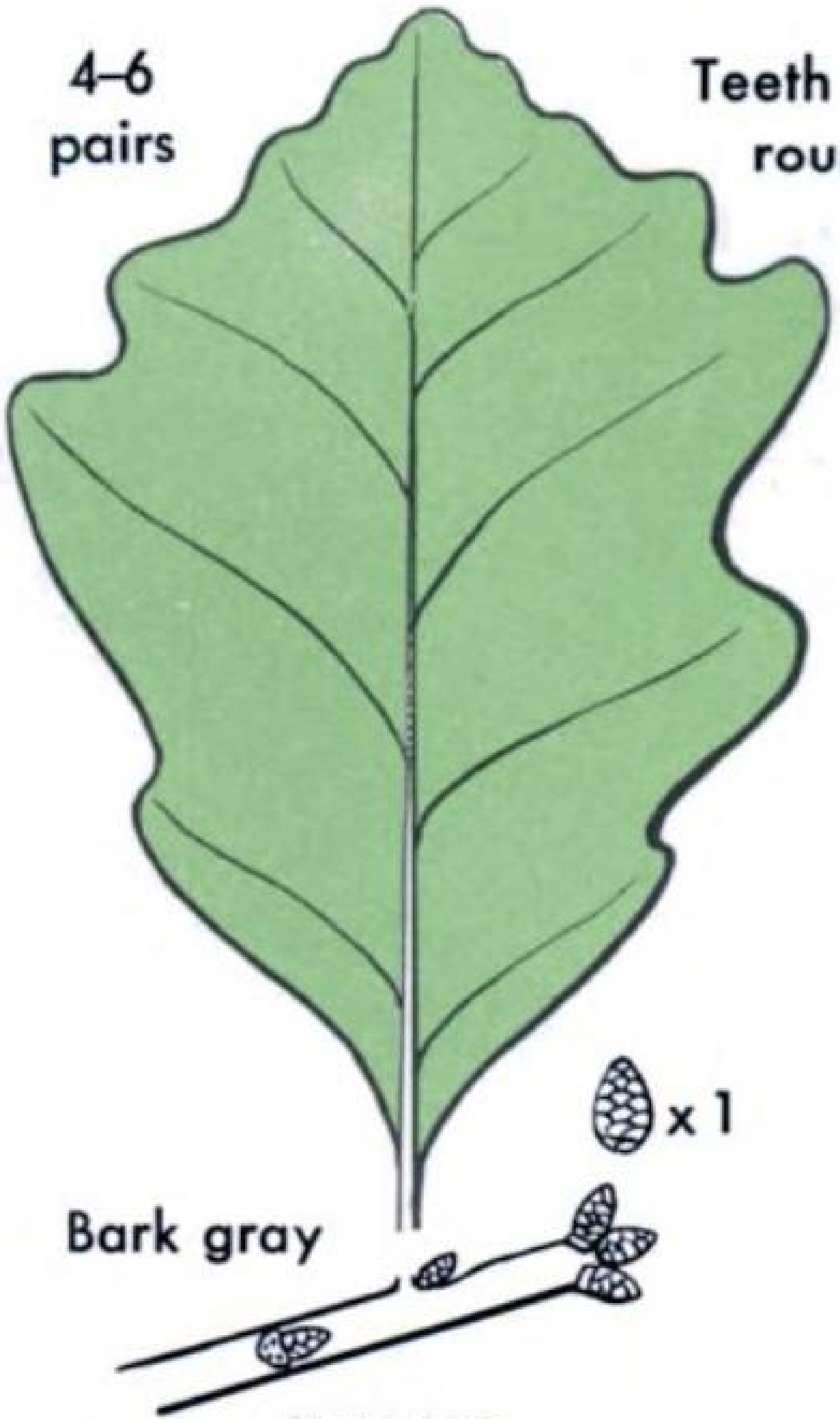
CHESTNUT



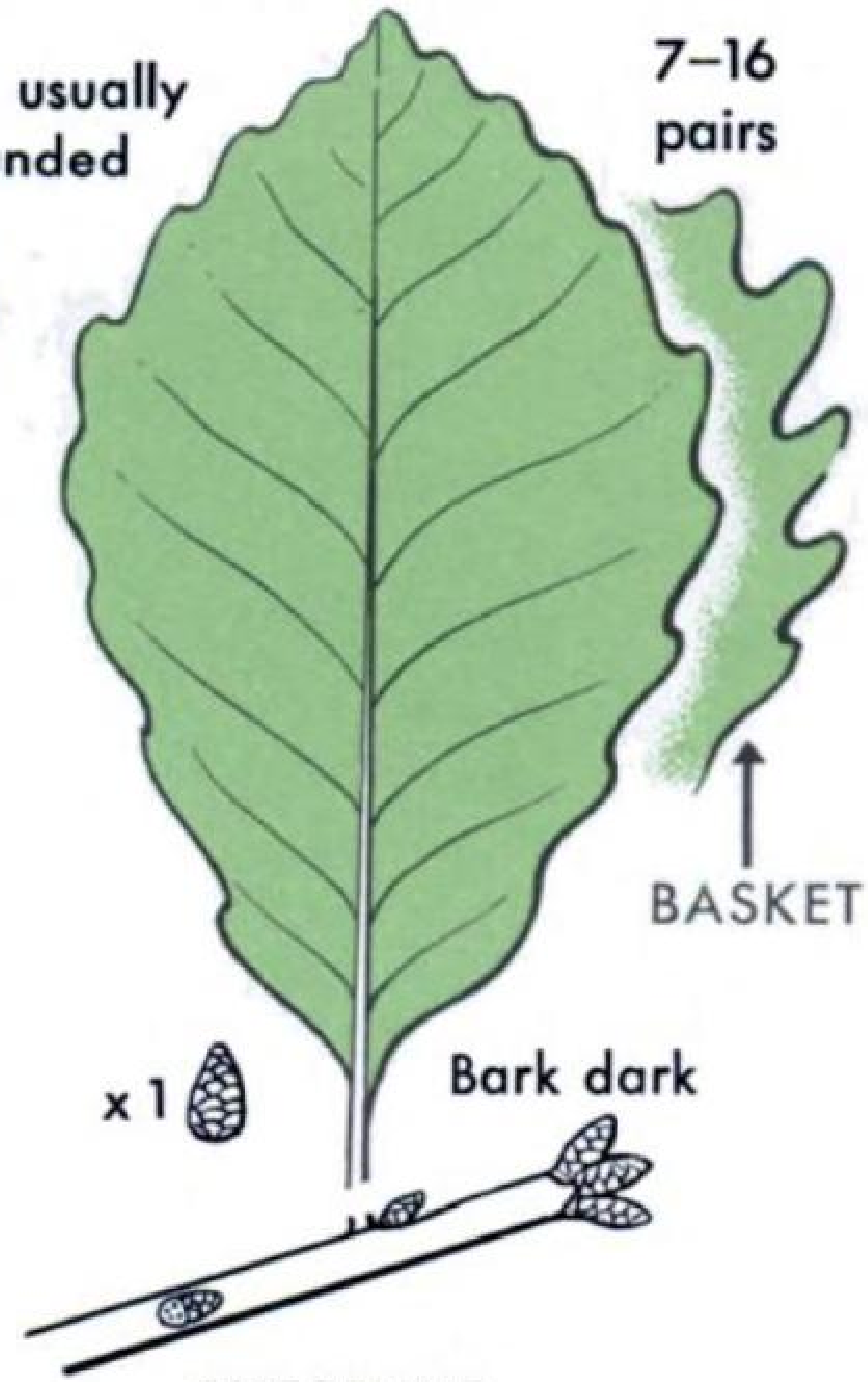
CHINQUAPIN

LEAVES TOOTHED OR WAVY-EDGED

Teeth usually rounded

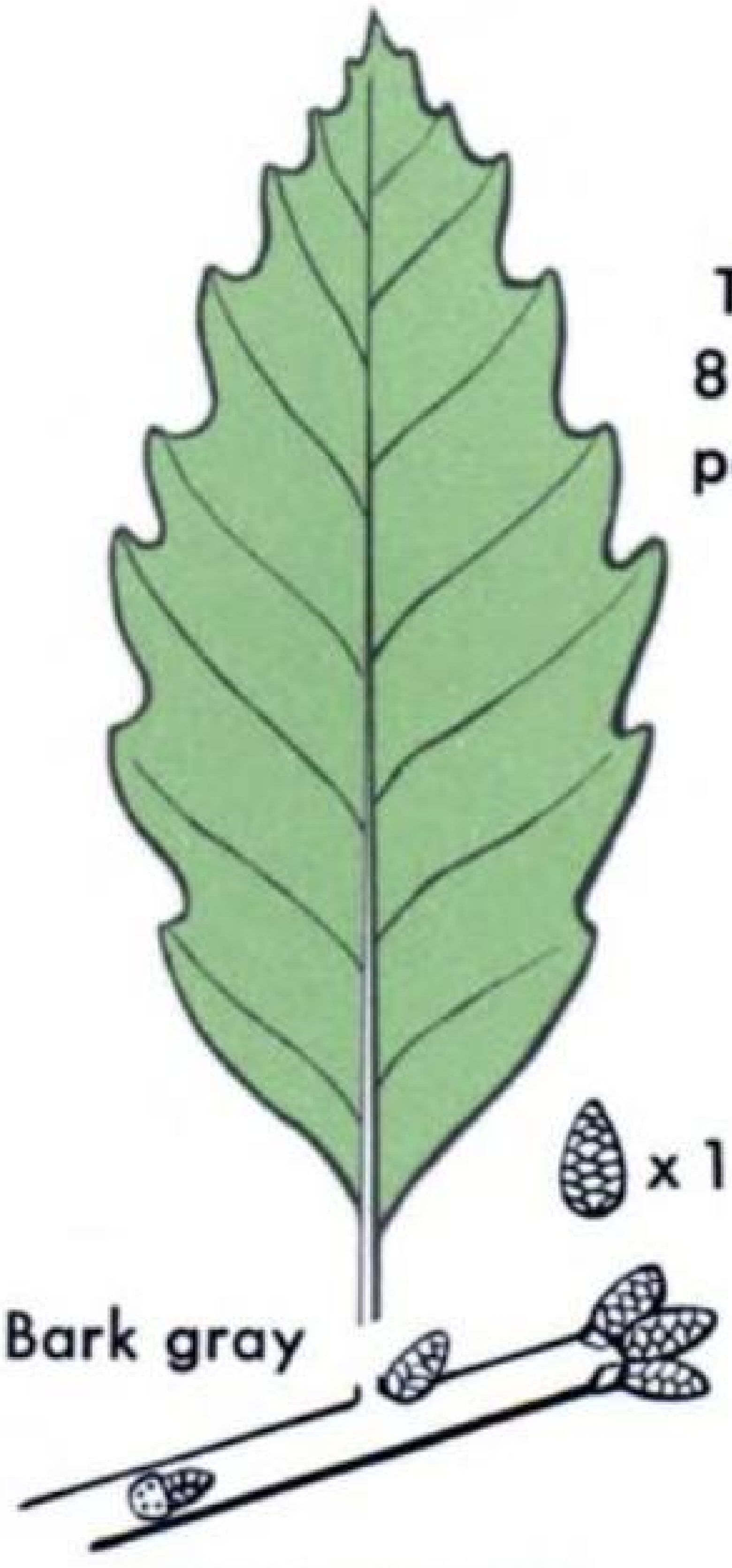

4–6
pairs
x 1
Bark gray

SWAMP

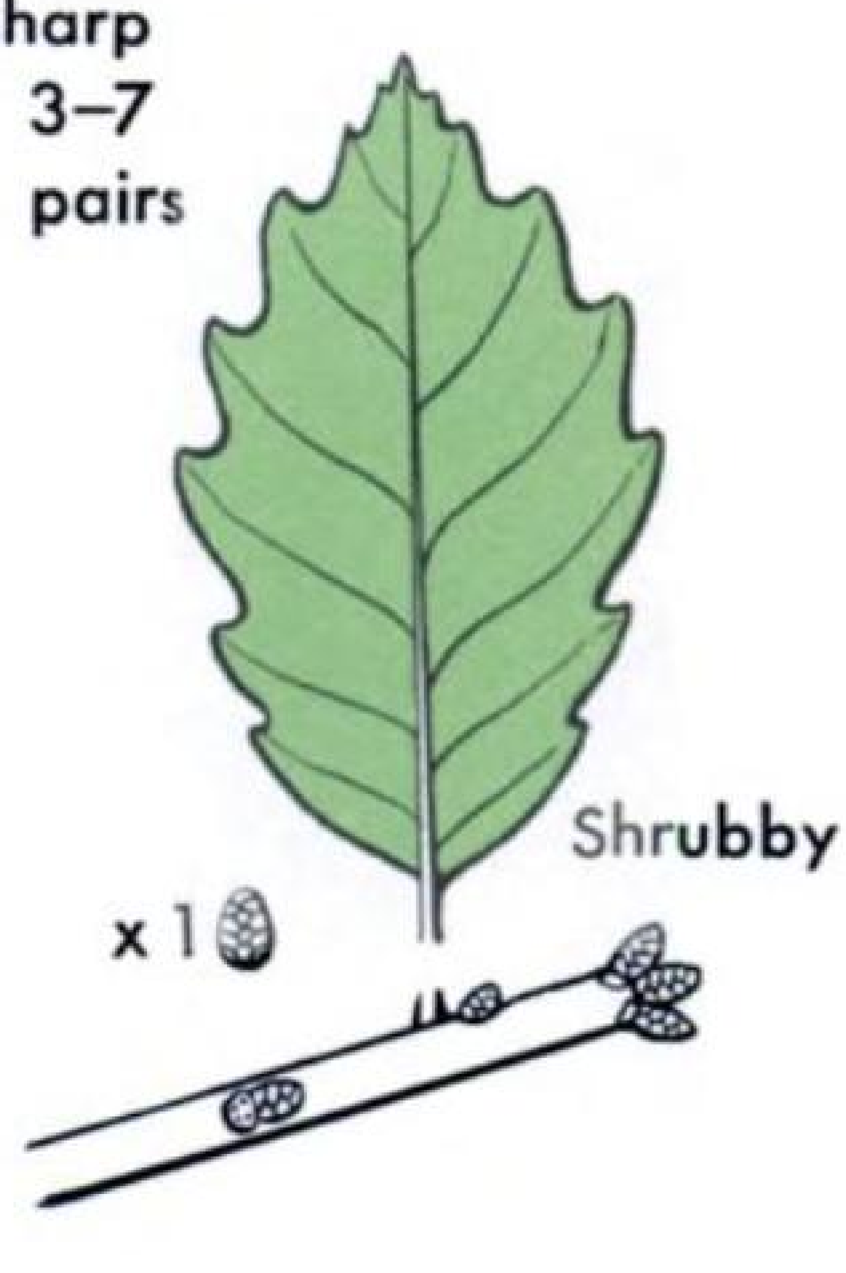

7–16
pairs
BASKET
x 1
Bark dark

CHESTNUT

Teeth usually sharp


8–13
pairs
x 1
Bark gray

CHINQUAPIN


3–7
pairs
Shrubby
x 1

DWARF

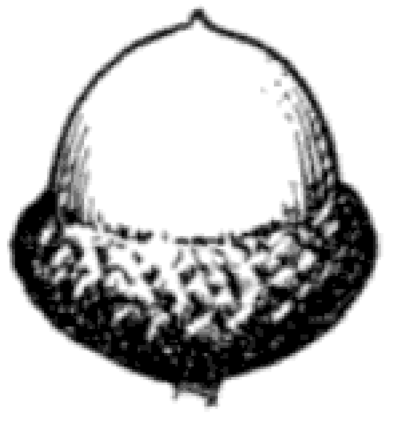
OAKS (4) — LEAVES NOT LOBED, TOOTHED, OR WAVY-EDGED

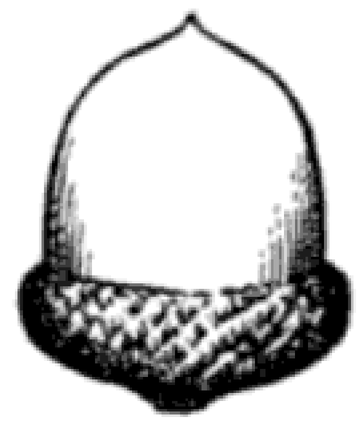
▲ SHINGLE OAK, *Quercus imbricaria* p. 221
Fertile woods; New Jersey, Pennsylvania, s. Michigan, and Iowa to S. Carolina, Tennessee, Louisiana, and se. Kansas.
  ▲ LAUREL OAK, *Q. laurifolia* (not illus.) p. 221

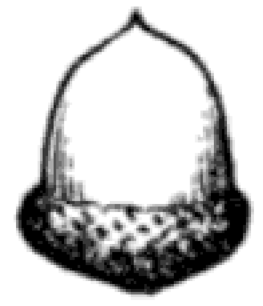
▲ WILLOW OAK, *Quercus phellos* p. 222
Coastal Plain uplands; se. New York to nw. Florida, west to e. Texas, and north in Mississippi Valley to s. Illinois, se. Missouri, and se. Oklahoma.
  ▲ SAND OAK, *Q. incana* (not illus.) p. 222

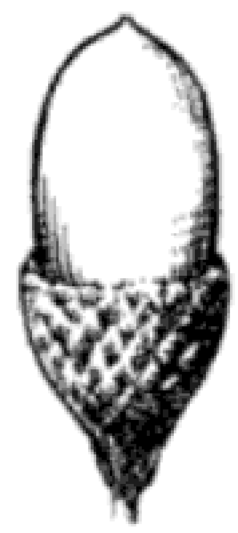
▲ WATER OAK, *Quercus nigra* p. 222
Coastal Plain and adjacent areas; s. New Jersey to centr. Florida, west to e. Texas, and north in Mississippi Valley to se. Missouri and e. Oklahoma.

▲ LIVE OAK, *Quercus virginiana* p. 222
Coastal Plain soils except toward Southwest, where it also occurs inland; se. Virginia to s. Florida, west to centr. Texas and sw. Oklahoma.
  ▲ DARLINGTON OAK, *Q. hemisphaerica* (not illus.) p. 222


SHINGLE


WILLOW


WATER

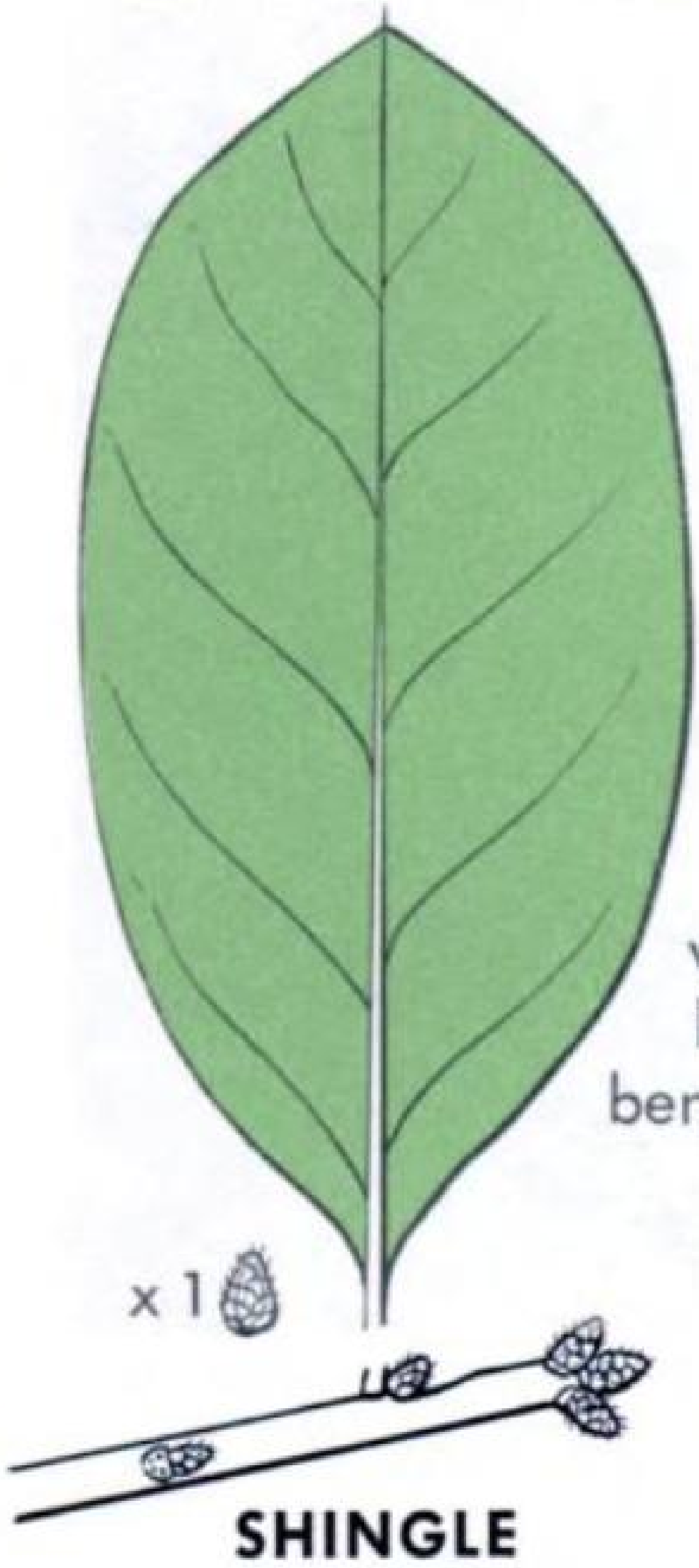

LIVE

LEAVES NOT LOBED, TOOTHED, OR WAVY-EDGED

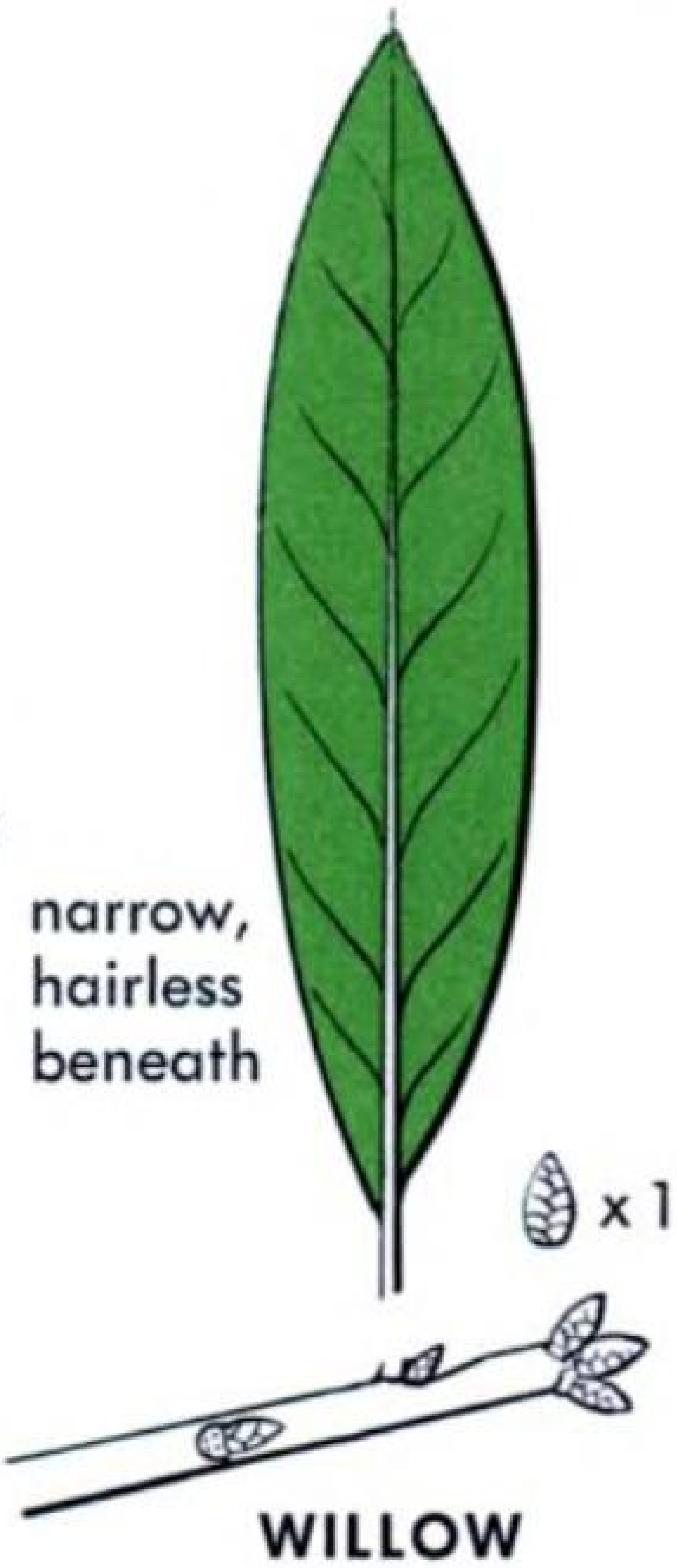
Leaves

wide,
hairy
beneath

narrow,
hairless
beneath



SHINGLE

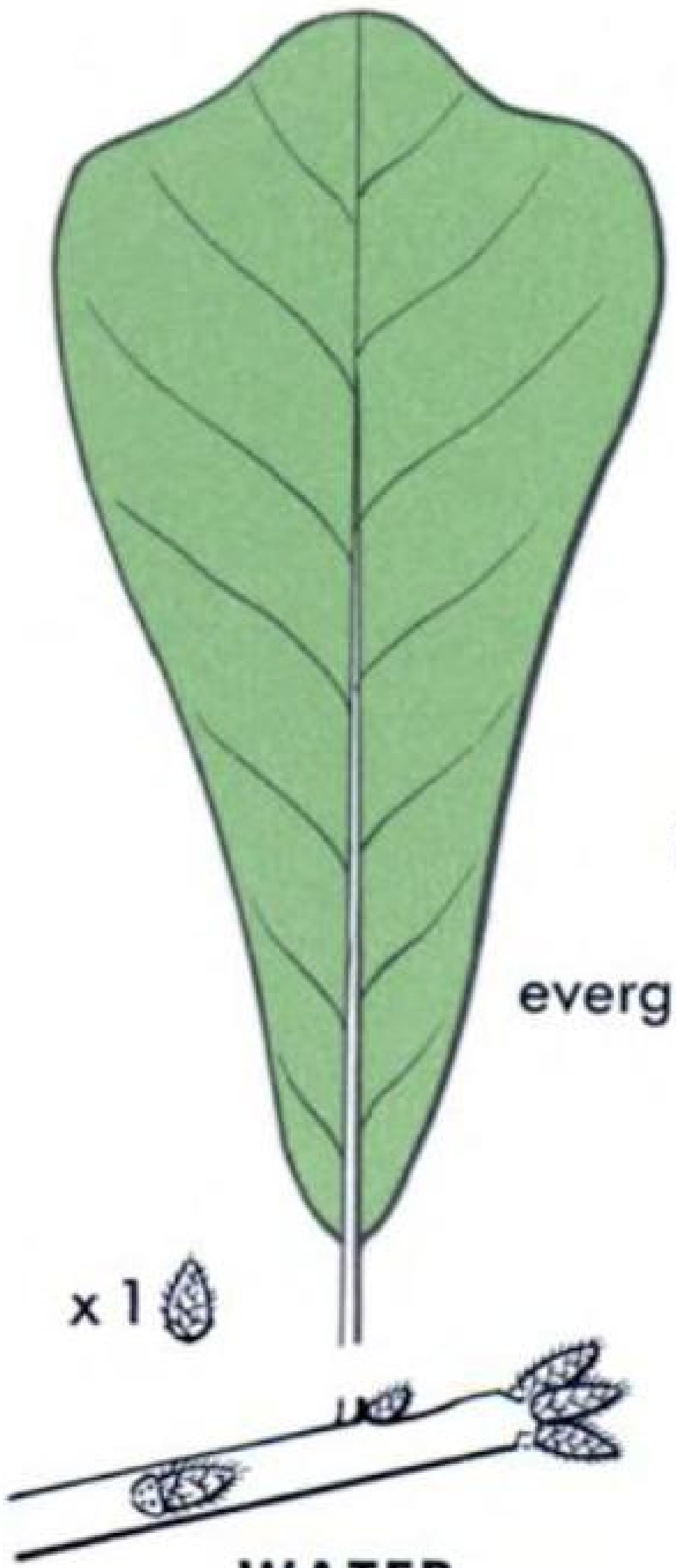


WILLOW

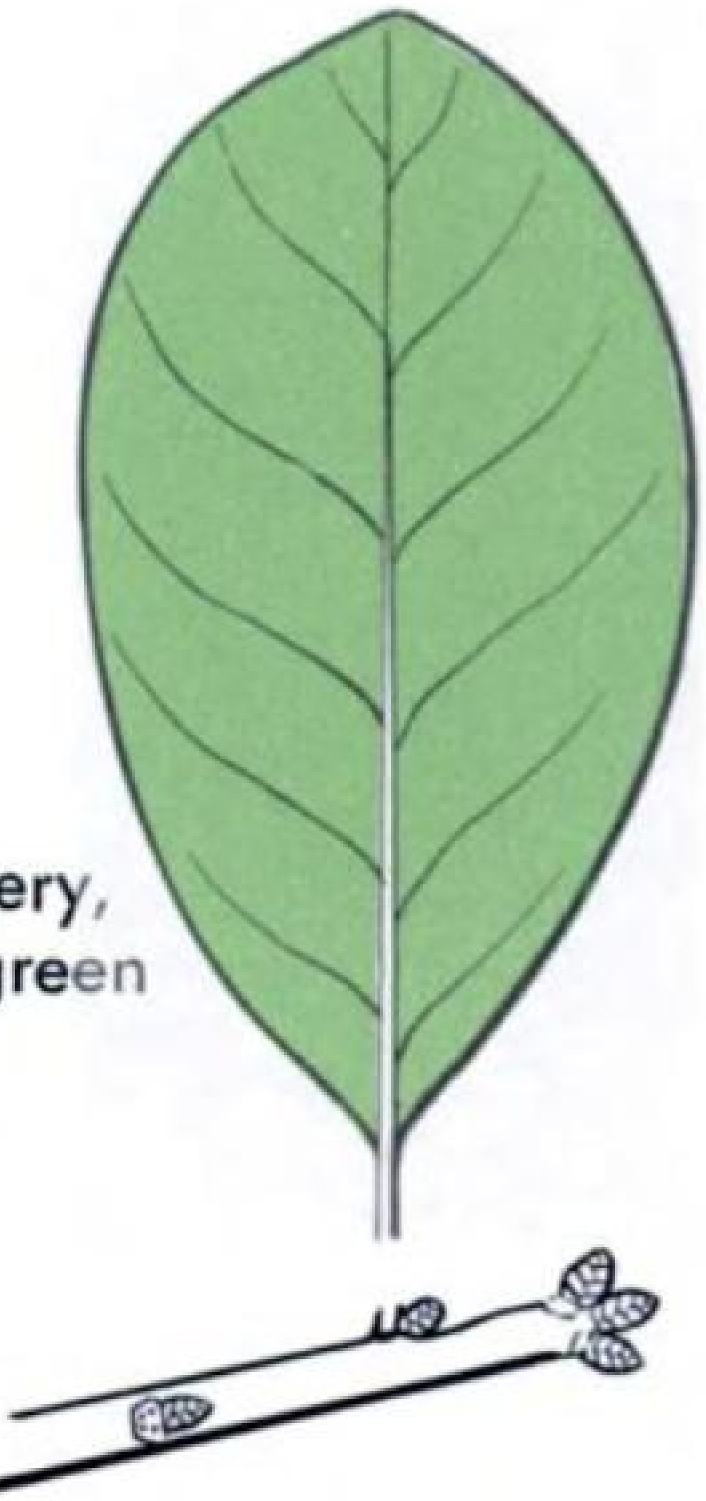
Leaves

thin,
not
evergreen

leathery,
evergreen



WATER



LIVE

MAGNOLIAS

Trees with leaves not toothed; twigs ringed; buds with a single bud scale; end buds large; bundle scars many.

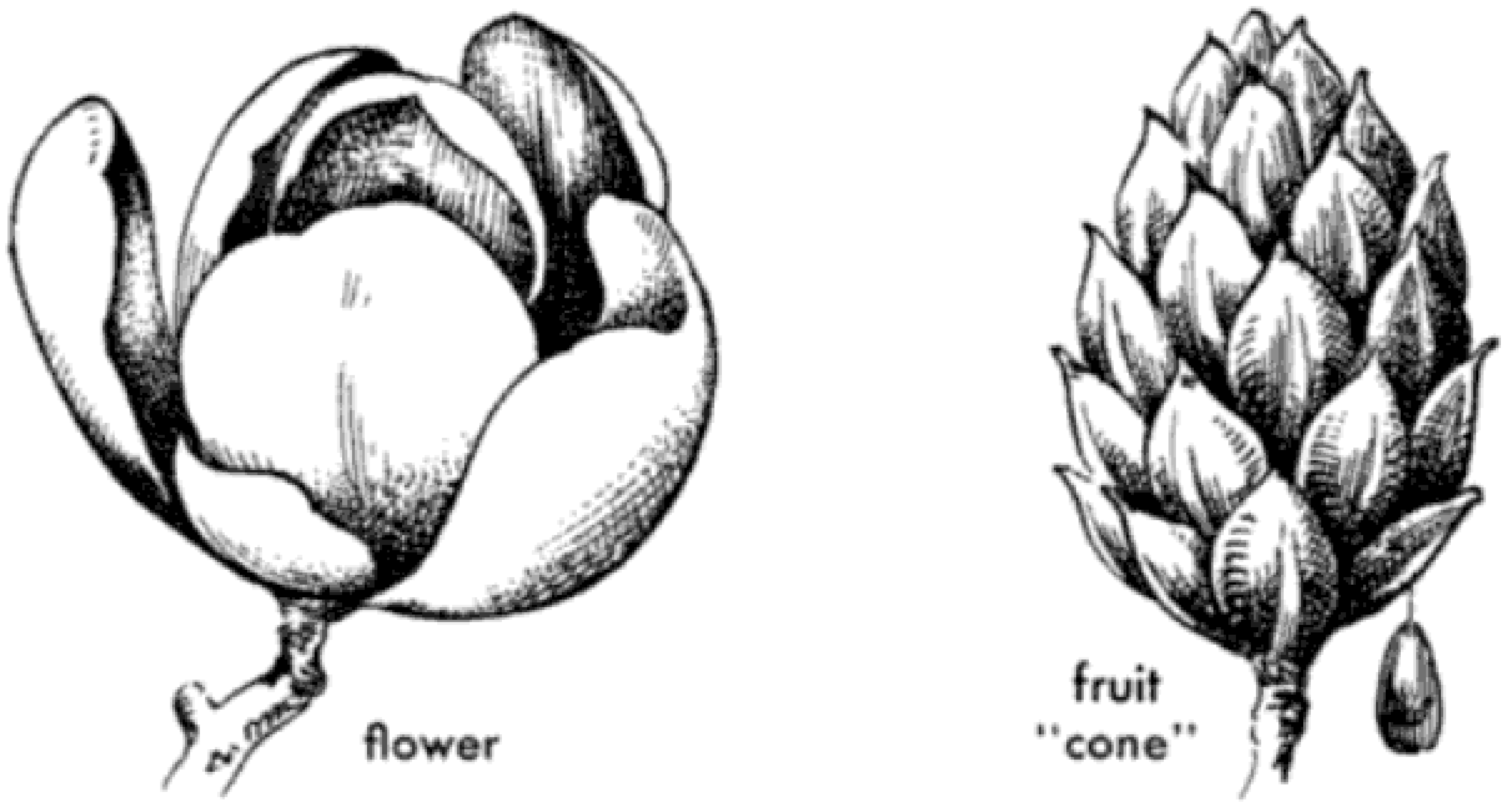
⬆Ψ SWEETBAY MAGNOLIA, *Magnolia virginiana* p. 223
Swamps and damp woods; e. Massachusetts, New Jersey, Pennsylvania, and Arkansas to Florida and Texas.

⬆ CUCUMBER MAGNOLIA, *Magnolia acuminata* p. 223
Mature woods; w. New York, s. Ontario, s. Illinois, and s. Missouri to Georgia, Louisiana, and se. Oklahoma.

⬆ BIGLEAF MAGNOLIA, *Magnolia macrophylla* p. 224
Mature forests; S. Carolina, W. Virginia, s. Ohio, and Arkansas to nw. Florida and Louisiana.

⬆ EARLEAF MAGNOLIA, *Magnolia fraseri* p. 224
Swamps and mountain streamsides; w. Virginia, W. Virginia, and e. Kentucky to n. Georgia and n. Alabama.

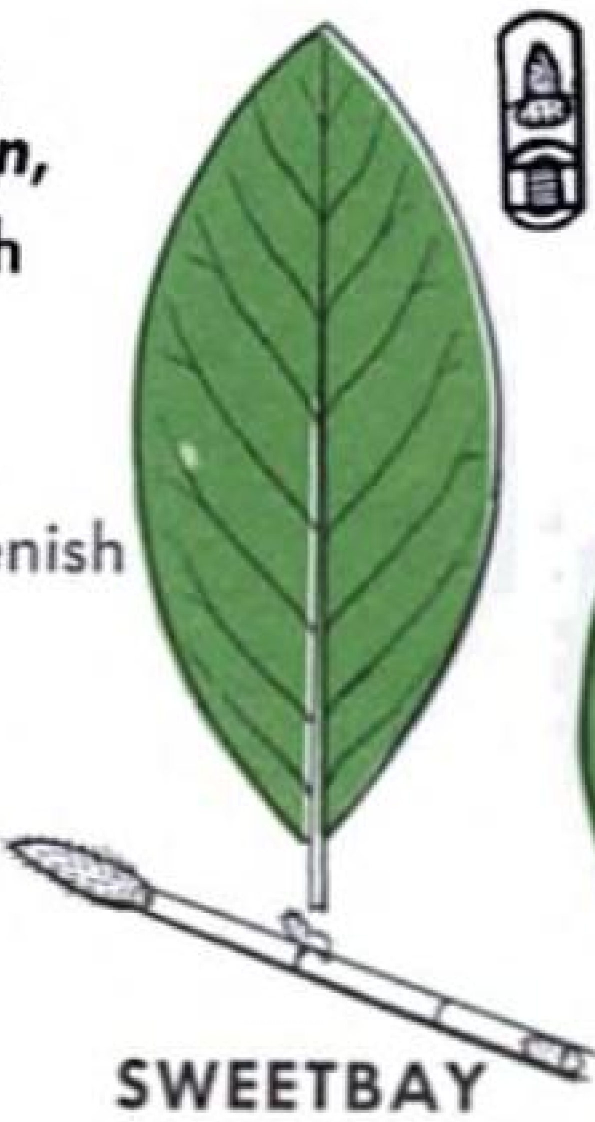
⬆ UMBRELLA MAGNOLIA, *Magnolia tripetala* p. 224
Mountain streamsides; s. Pennsylvania, Ohio, Kentucky, and Missouri to Georgia, Arkansas, and se. Oklahoma.



SWEETBAY MAGNOLIA

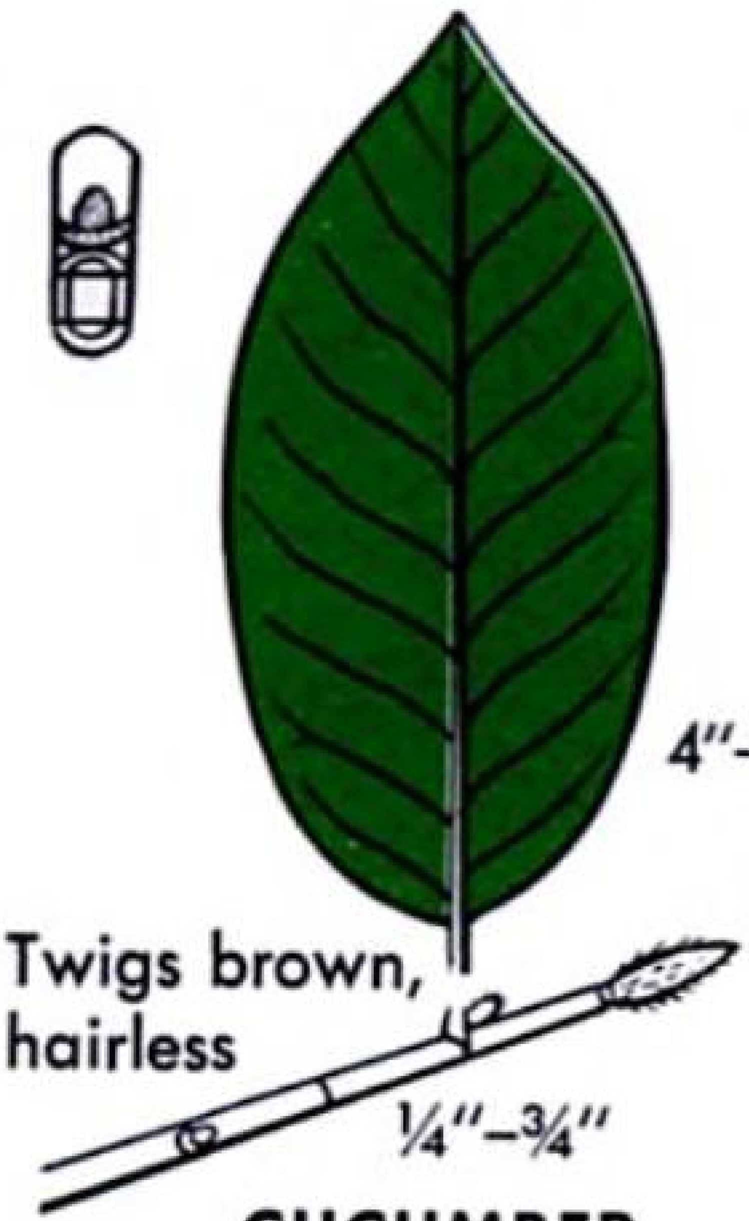
Leaves thick, often evergreen,
whitish beneath
4"–6"

Buds hairy, green;
twigs hairless, greenish



Pith chambered ←

SWEETBAY



4"–10"

Twigs brown, hairless

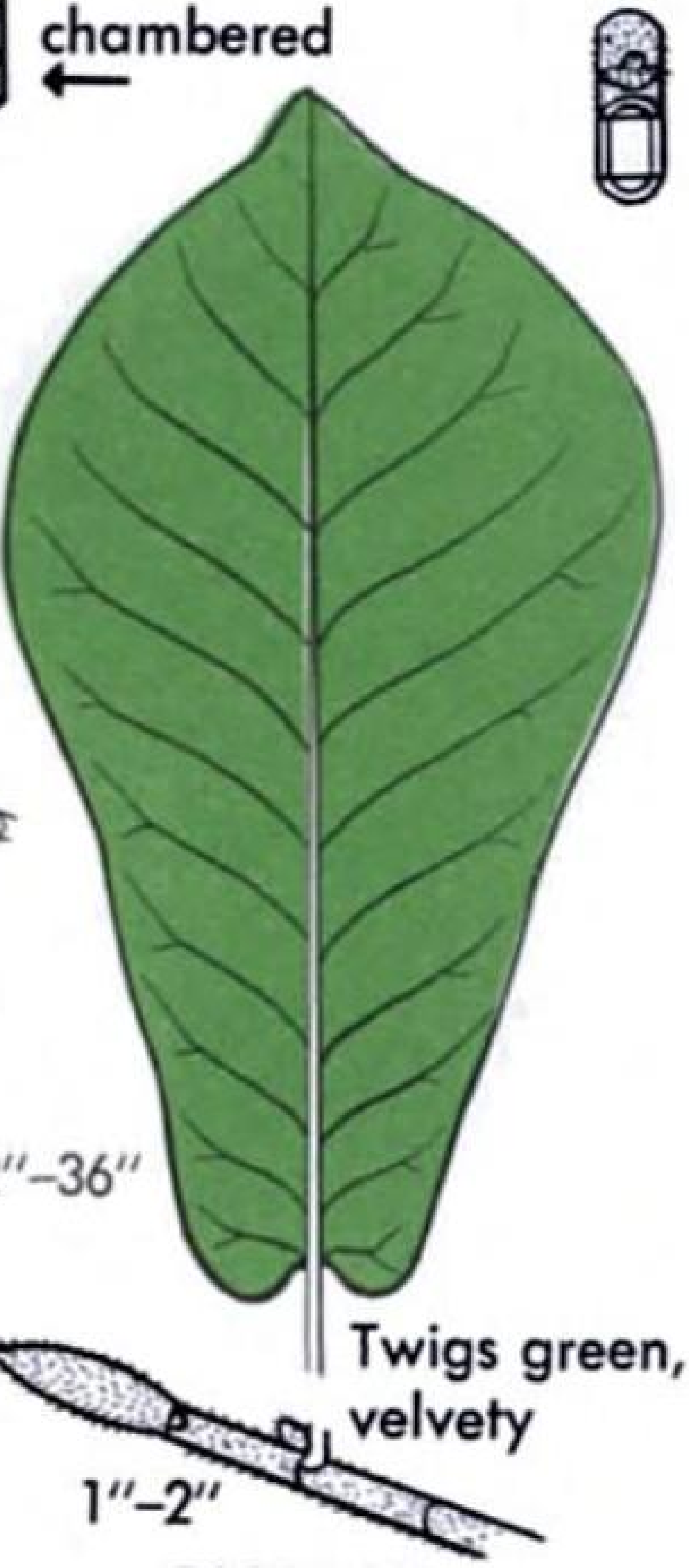
¼"–¾"

CUCUMBER

Leaves thin, not evergreen

Buds hairy

End buds whitish



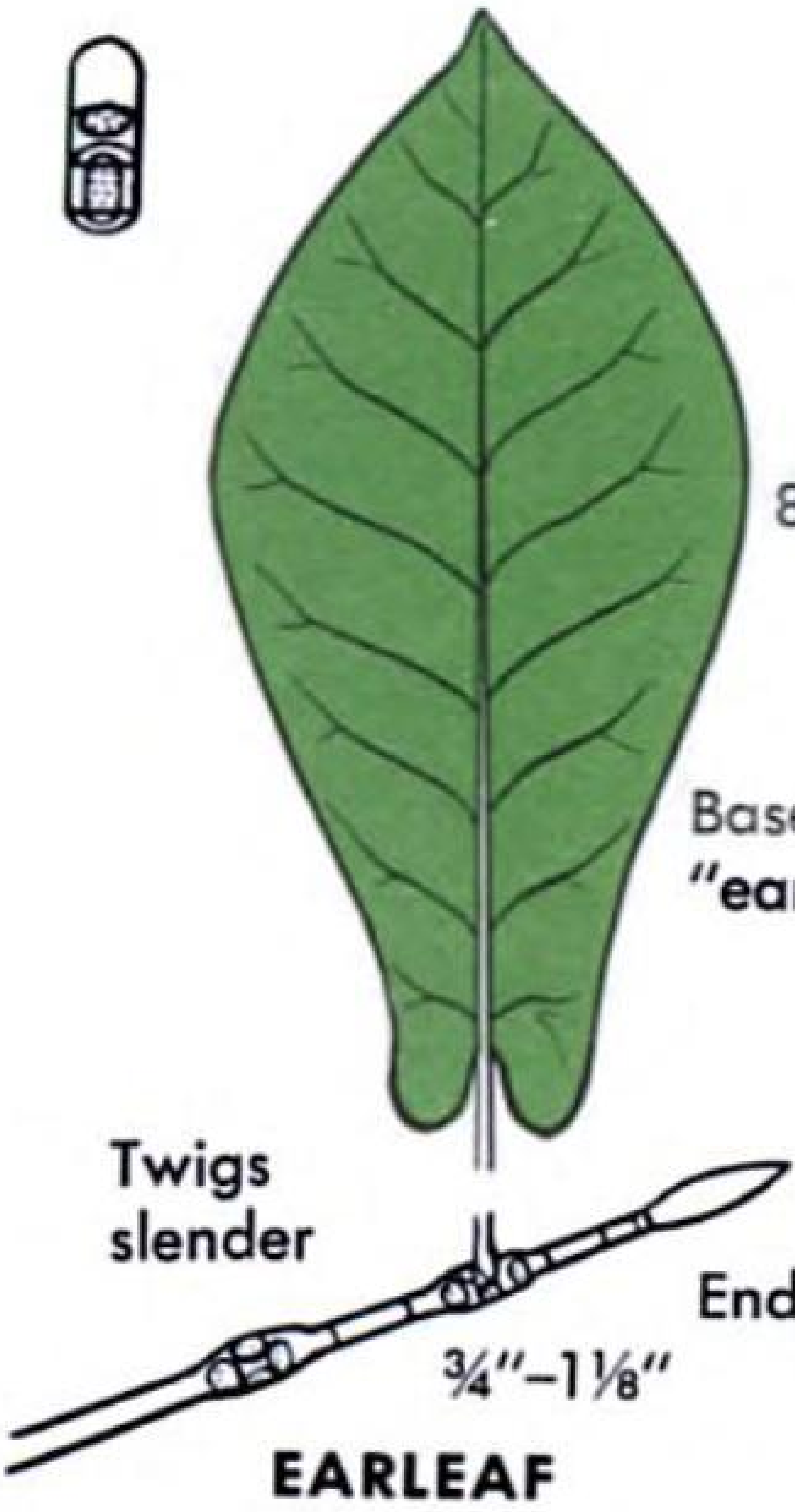
12"–36"

Twigs green, velvety

1"–2"

BIGLEAF

Leaves thin, not evergreen



8"–18"

Bases "eared"

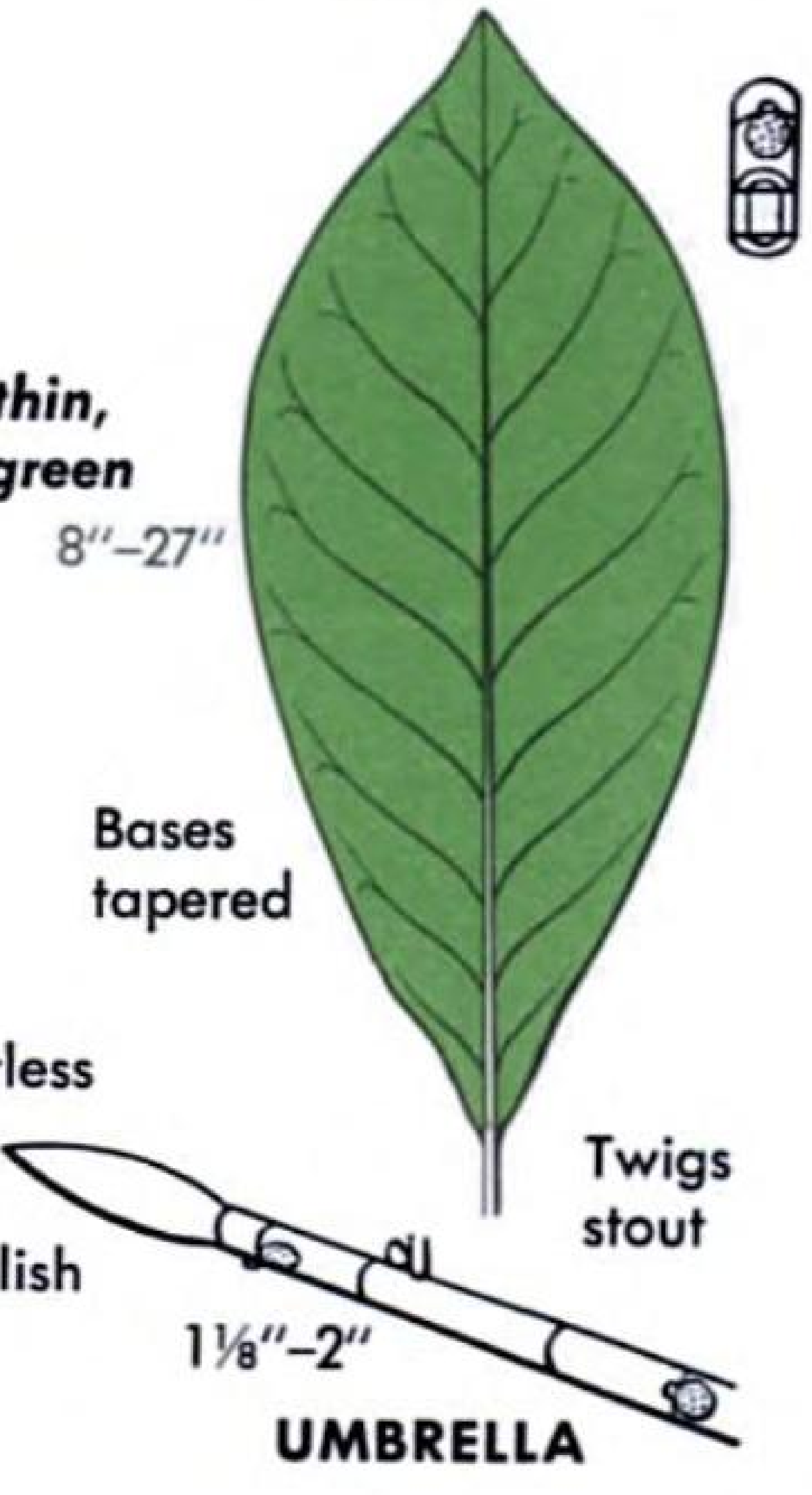
Twigs slender

¾"–1⅛"

EARLEAF

Buds hairless

End buds purplish



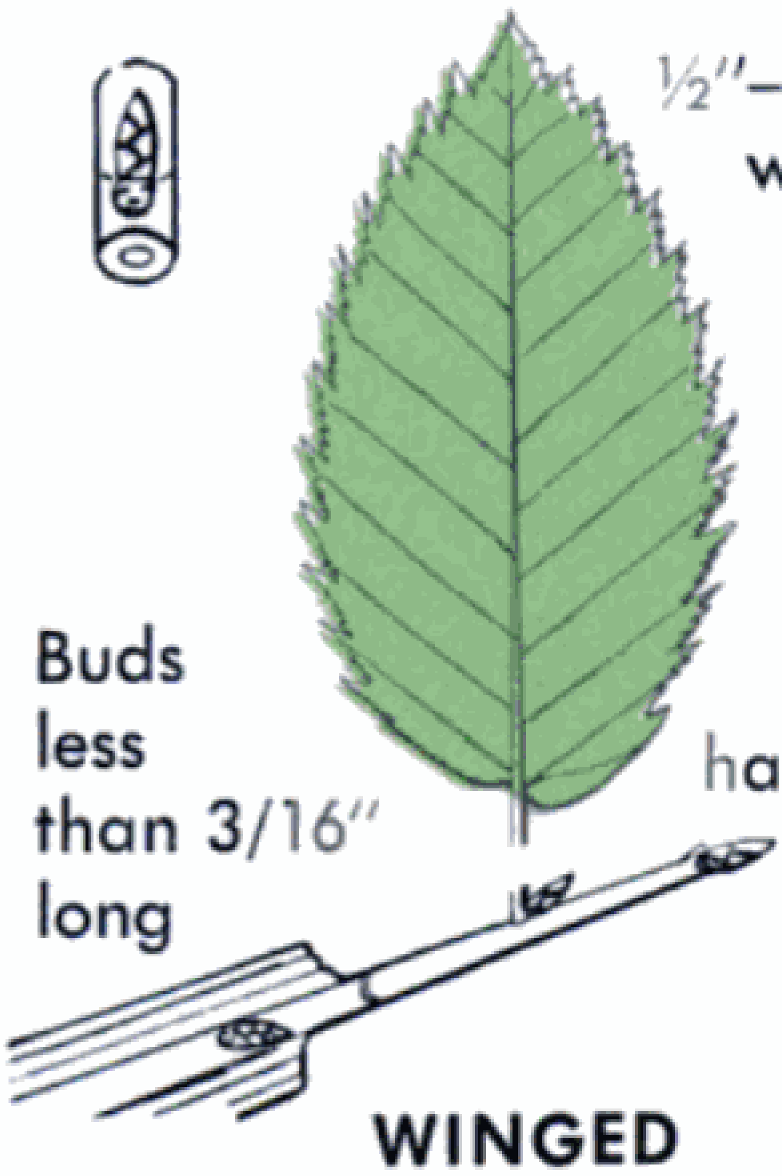
8"–27"

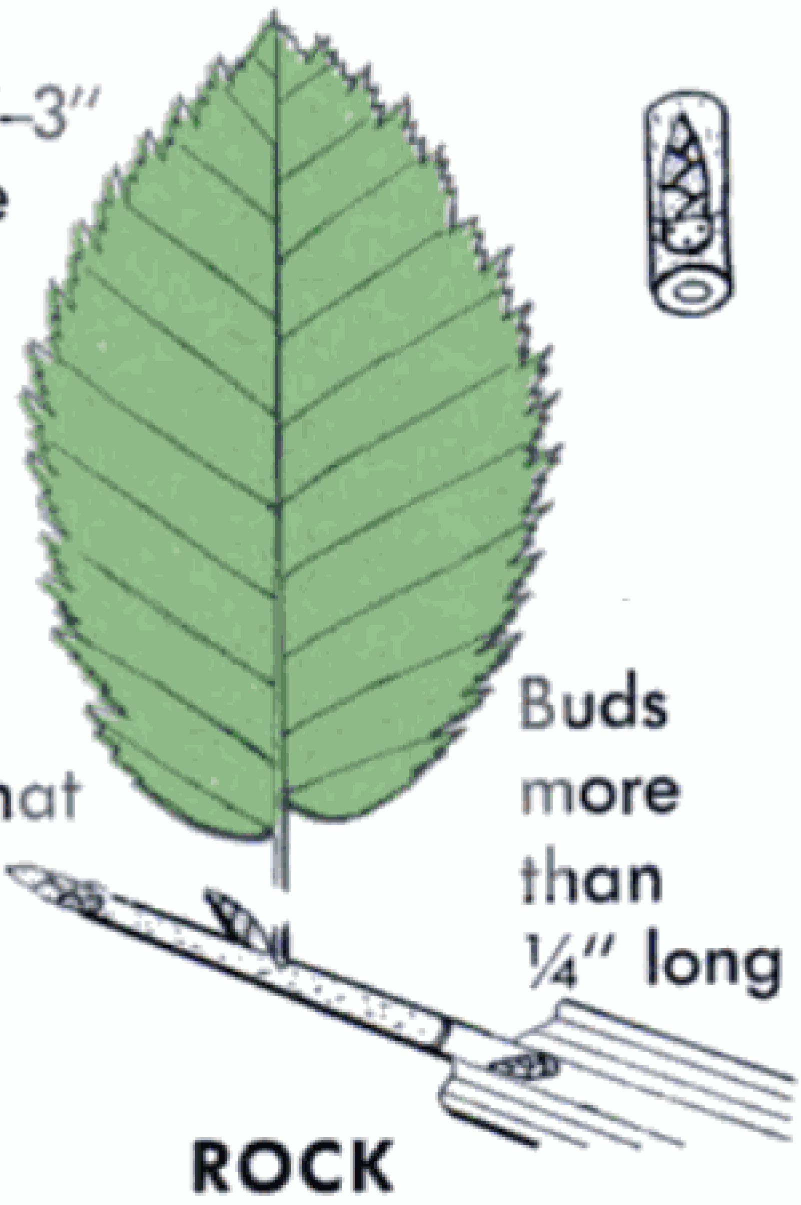
Bases tapered

Twigs stout

1⅛"–2"

UMBRELLA





Leaves smooth above

½"–1⅝" wide

1¼"–3" wide

Buds rusty brown; scales with darker edges

Buds less than 3/16" long

Twigs and buds

hairless

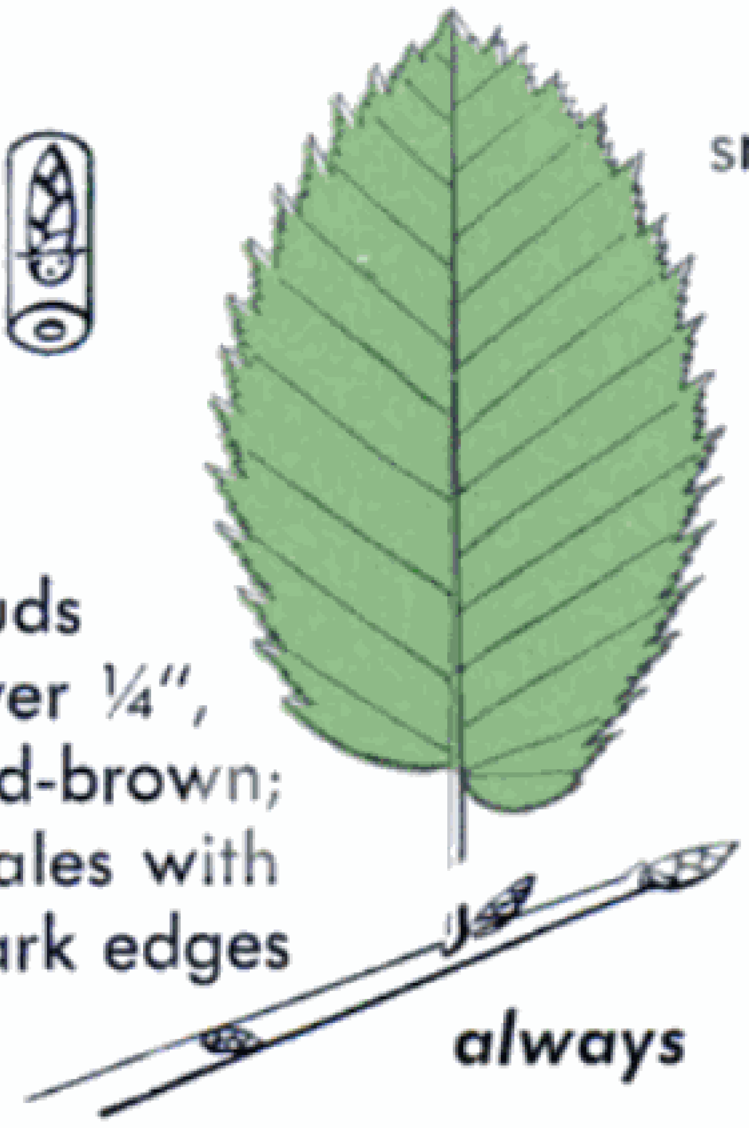
somewhat hairy

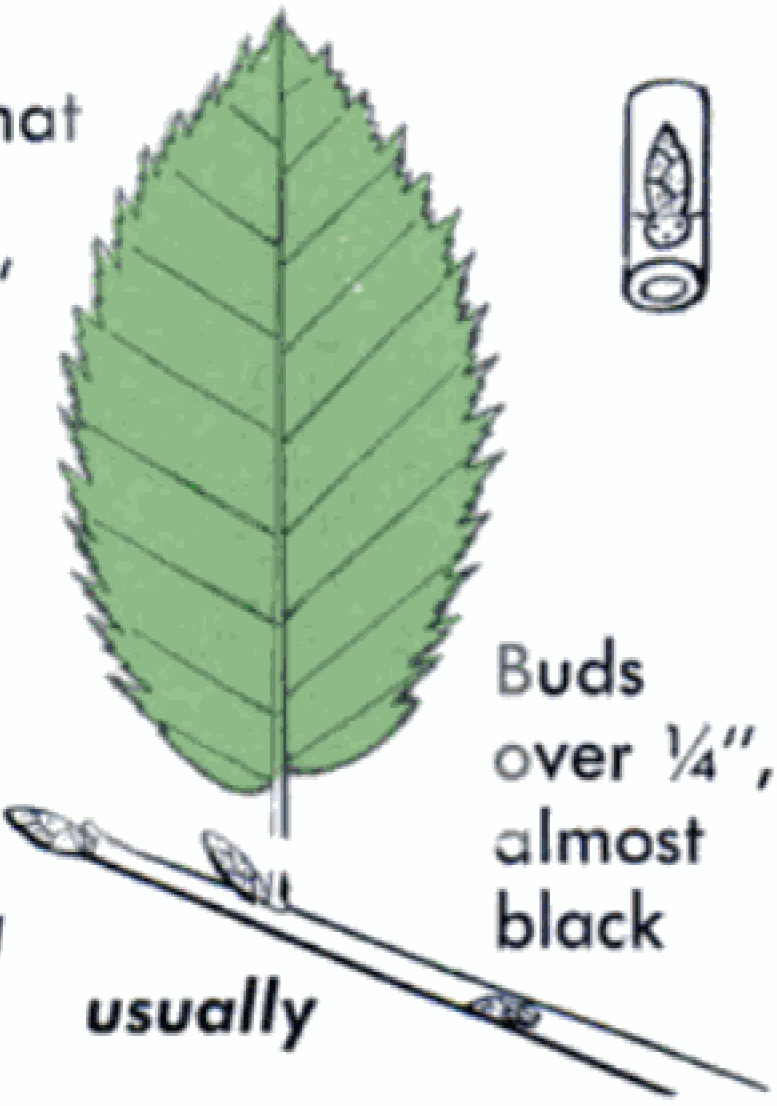
Buds more than ¼" long

Corky "wings" usually present on branchlets

WINGED

ROCK





Leaves

smooth or

somewhat

"sandpapery" above

2"–6" long

1½"–3" long

Buds over ¼", red-brown; scales with dark edges

Twigs and buds hairless or nearly

Buds over ¼", almost black

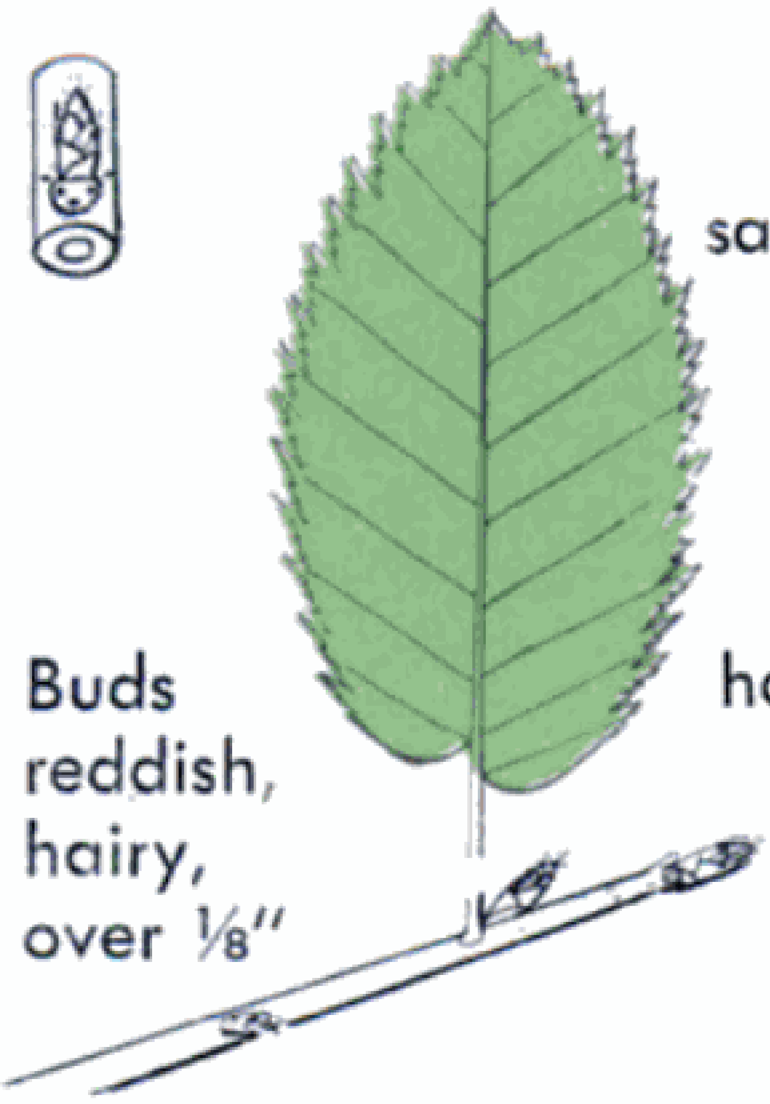
Corky "wings" lacking

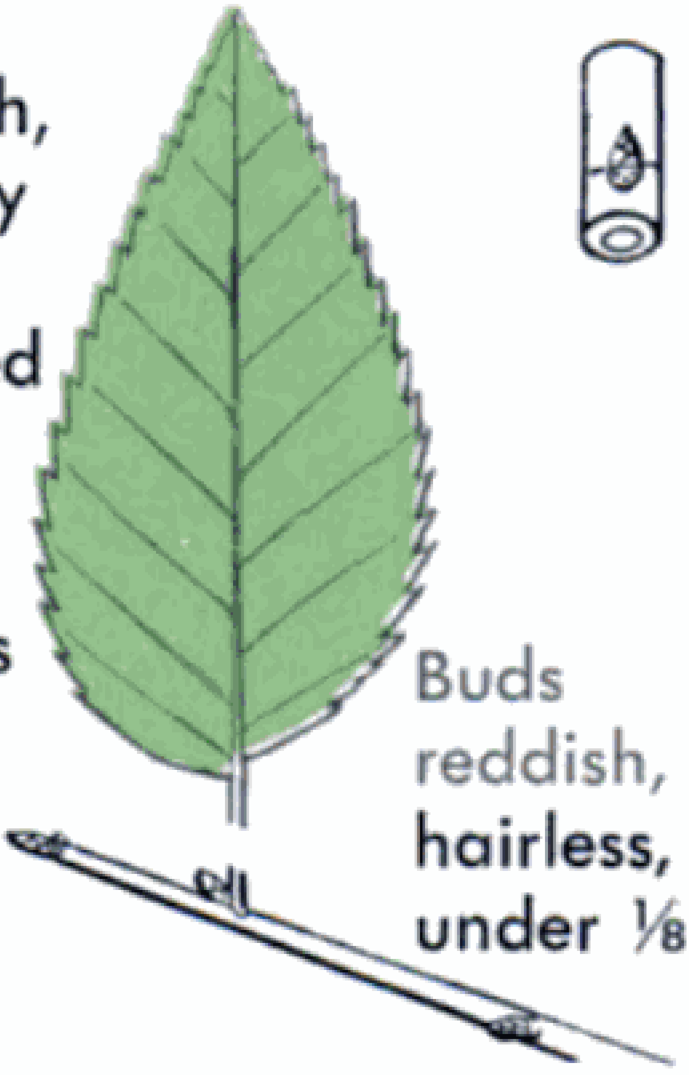
always

usually

AMERICAN

ENGLISH





Leaves

very sandpapery above

smooth, usually singly toothed

Twigs

hairy

hairless

Buds reddish, hairy, over ⅛"

Buds reddish, hairless, under ⅛"

No corky "wings"

SLIPPERY

WATER

IRONWOOD, HORNBEAM, HAZELNUTS, ALDERS

Trees and shrubs with mostly double-toothed leaves. Leaf bases even. Buds characteristic as on plate opposite. In all species the twigs are variably hairy or hairless.

♠ IRONWOOD, *Carpinus caroliniana* p. 227
Bottomlands and other rich soils; New England, s. Quebec, s. Ontario, and e. Minnesota to Florida and Texas.

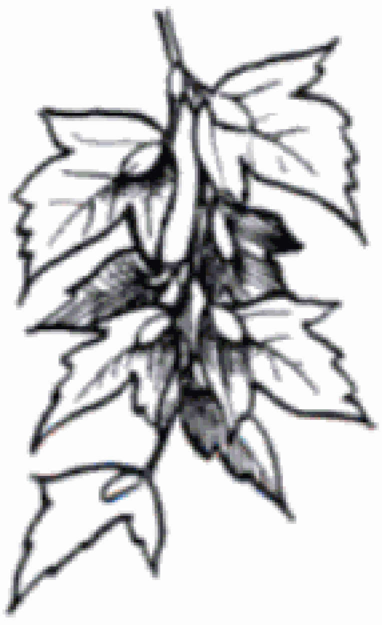
♠ HORNBEAM, *Ostrya virginiana* p. 228
Fertile woods; Nova Scotia and s. Manitoba to Florida and Texas.

V AMERICAN HAZELNUT, *Corylus americana* p. 228
Woods borders and thickets; Maine and Saskatchewan to Georgia, Missouri, and Oklahoma.
V BEAKED HAZELNUT, *C. cornuta* (fruit illus.) p. 228

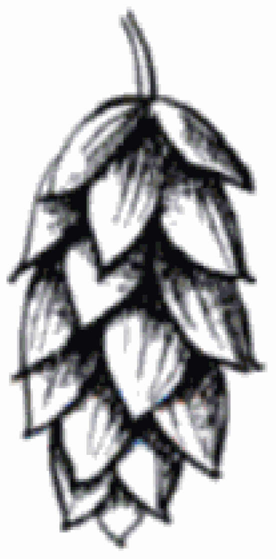
♠ EUROPEAN BLACK ALDER, *Alnus glutinosa* p. 229
Wet soils; escape, Newfoundland and Illinois to Delaware and Pennsylvania.
♠ EUROPEAN WHITE ALDER p. 229
A. incana (not illus.)
♠V SEASIDE ALDER, *A. maritima* (twig illus.) p. 229

♠V SMOOTH ALDER, *Alnus serrulata* p. 229
Streambanks and swamp borders; sw. Nova Scotia, centr. Vermont, New York, s. Michigan, Illinois, Missouri, and se. Oklahoma to nw. Florida and Louisiana.

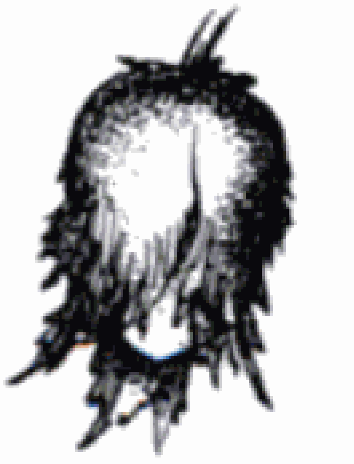
♠V SPECKLED ALDER, *Alnus rugosa* p. 230
Streambanks and swampy places; Newfoundland, Labrador, and Saskatchewan to Massachusetts, Pennsylvania, w. Maryland, W. Virginia, n. Ohio, n. Indiana, and ne. Iowa.
V MOUNTAIN ALDER, *A. crispa* (twig illus.) p. 230



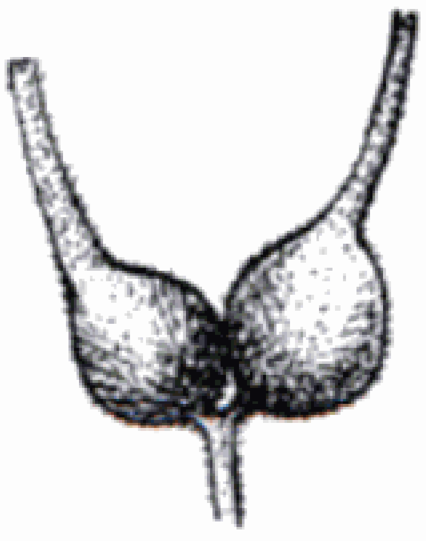
IRONWOOD



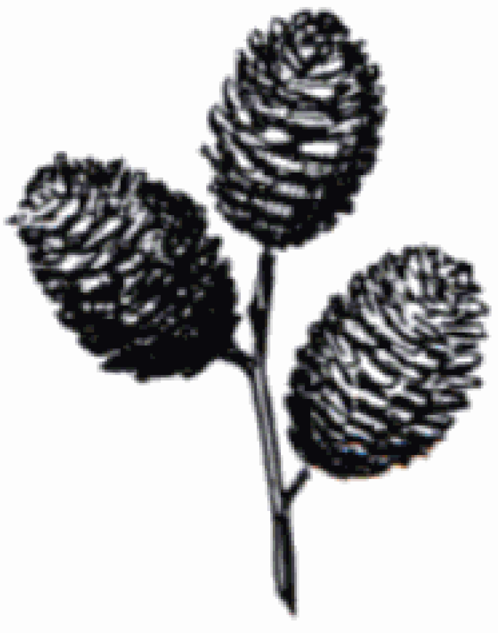
HORNBEAM



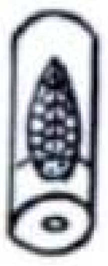
AMERICAN HAZELNUT



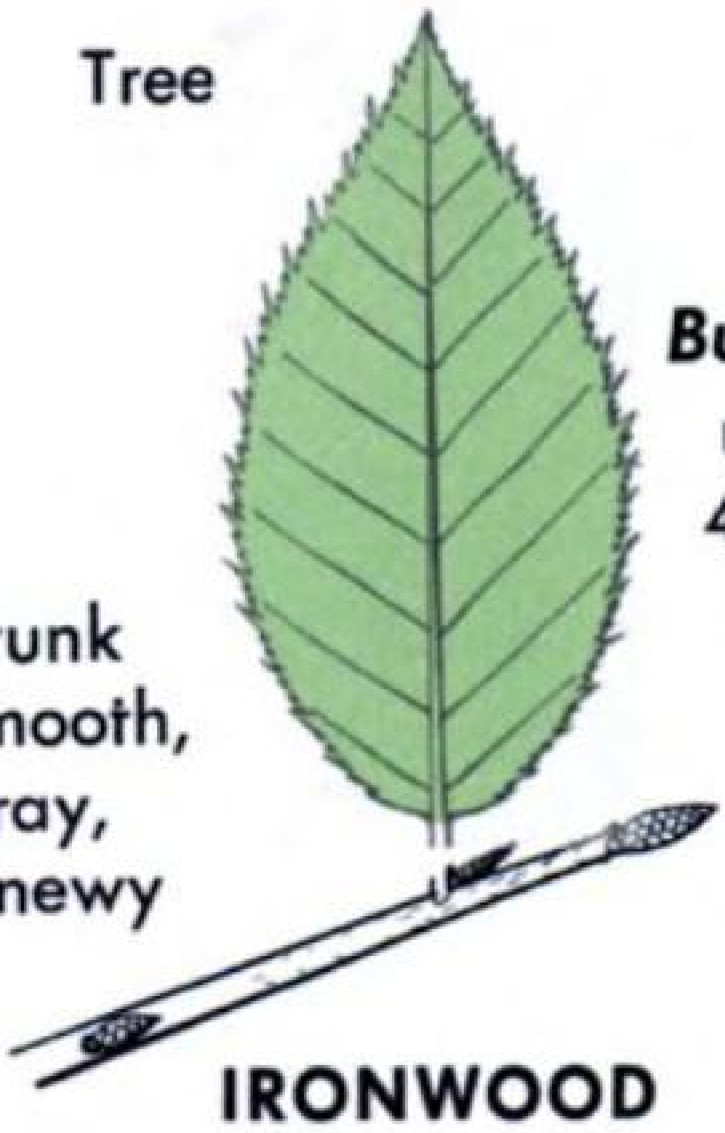
BEAKED HAZELNUT



ALDERS



Tree



Trunk
smooth,
gray,
sinewy

IRONWOOD

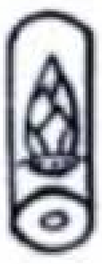
Leaf tips pointed

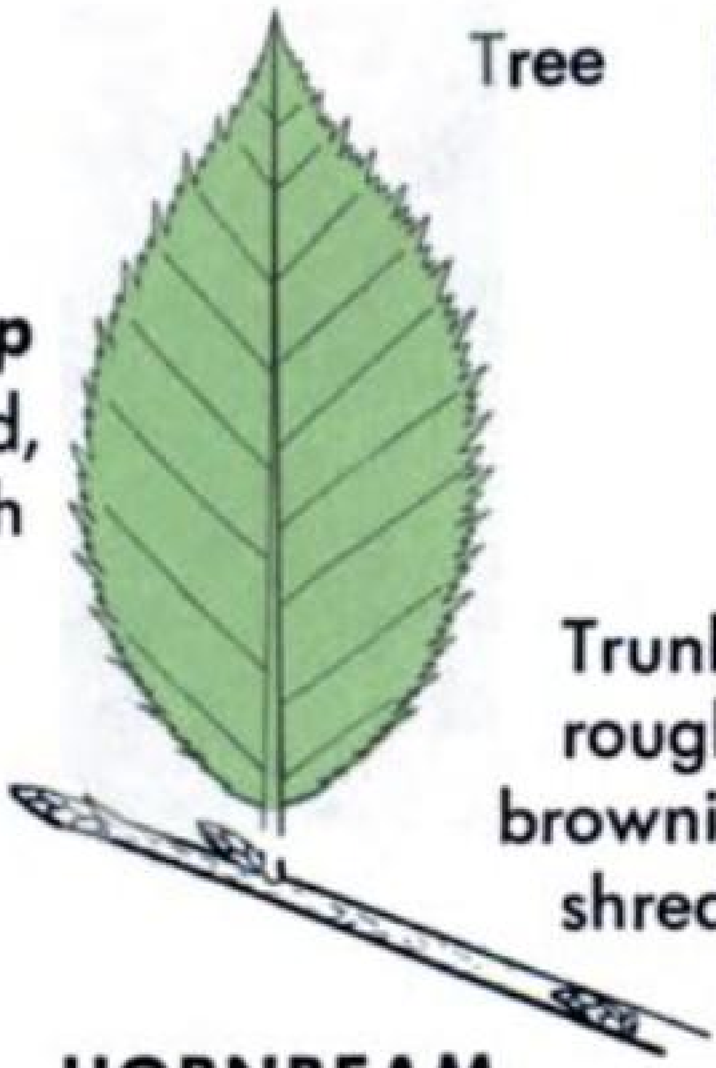
Buds not stalked, sharp

usually 4-sided, brown | rounded, greenish

End buds false

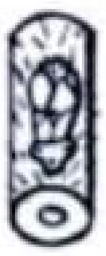
Tree



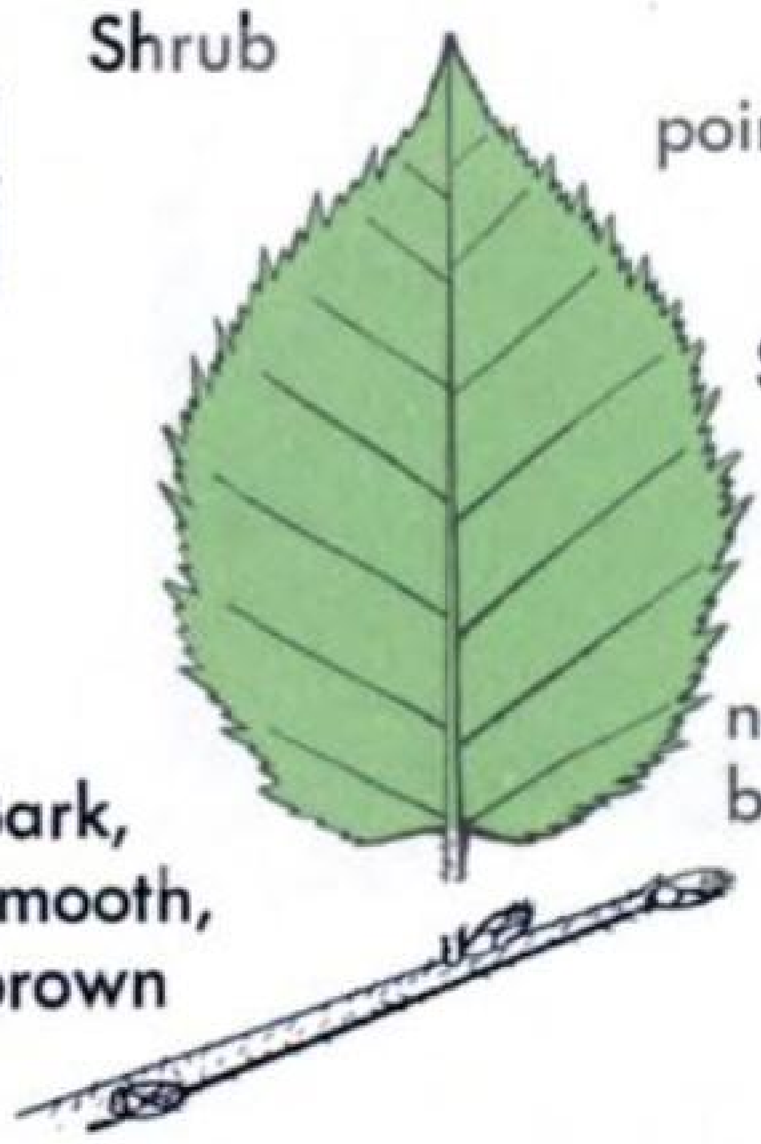


Trunk
rough,
brownish,
shreddy

HORNBEAM



Shrub



Bark,
smooth,
brown

AMERICAN HAZELNUT

Leaf tips

pointed | square or notched

Small "pine cones"

absent | present

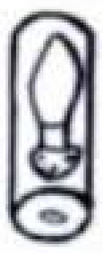
Buds rounded, blunt

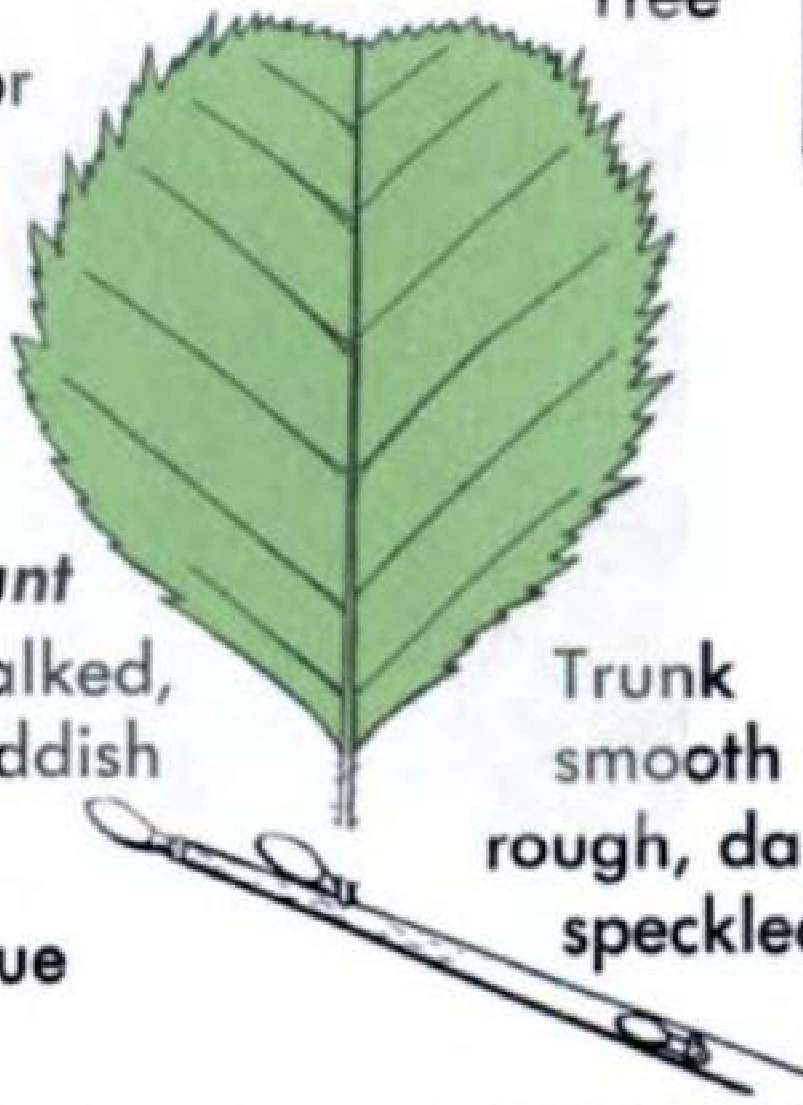
not stalked, brown-gray | stalked, reddish

End buds

false | true

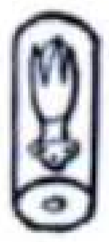
Tree





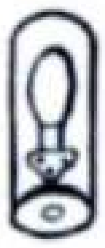
Trunk
smooth or
rough, dark,
speckled

EUROPEAN BLACK ALDER

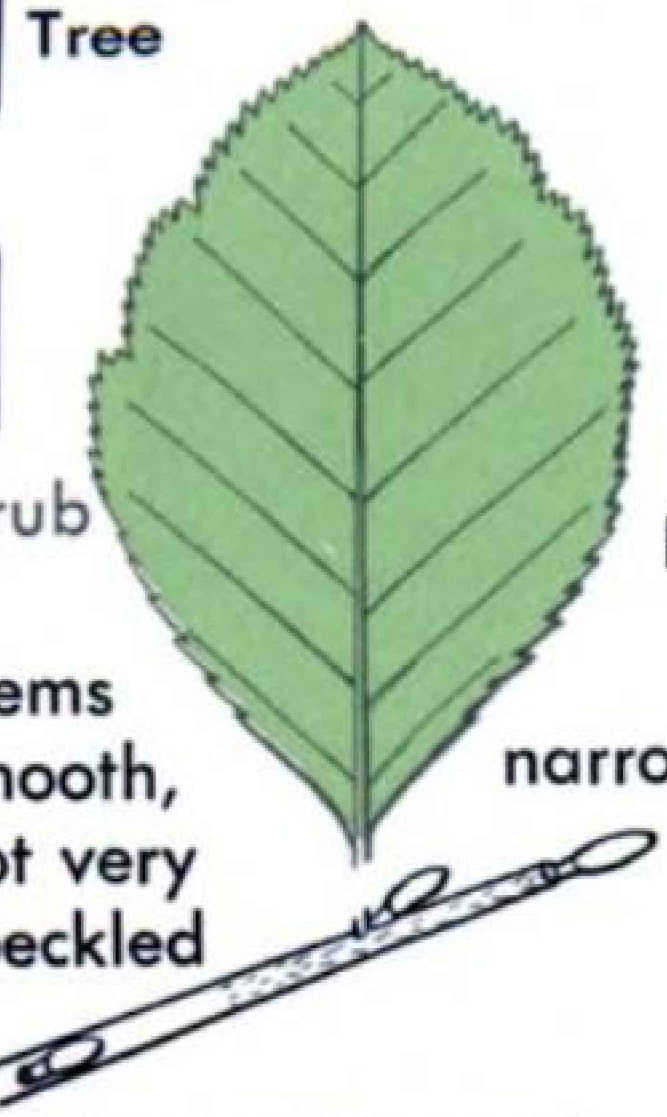


← SEASIDE ALDER

Tree



Shrub



Stems
smooth,
not very
speckled

SMOOTH ALDER

Leaf tips pointed

Small "pine cones" usually present

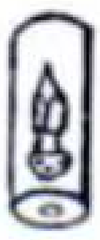
erect, not pendent | hanging, pendent

Leaf bases

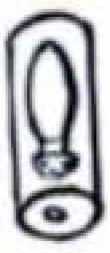
narrow | broad

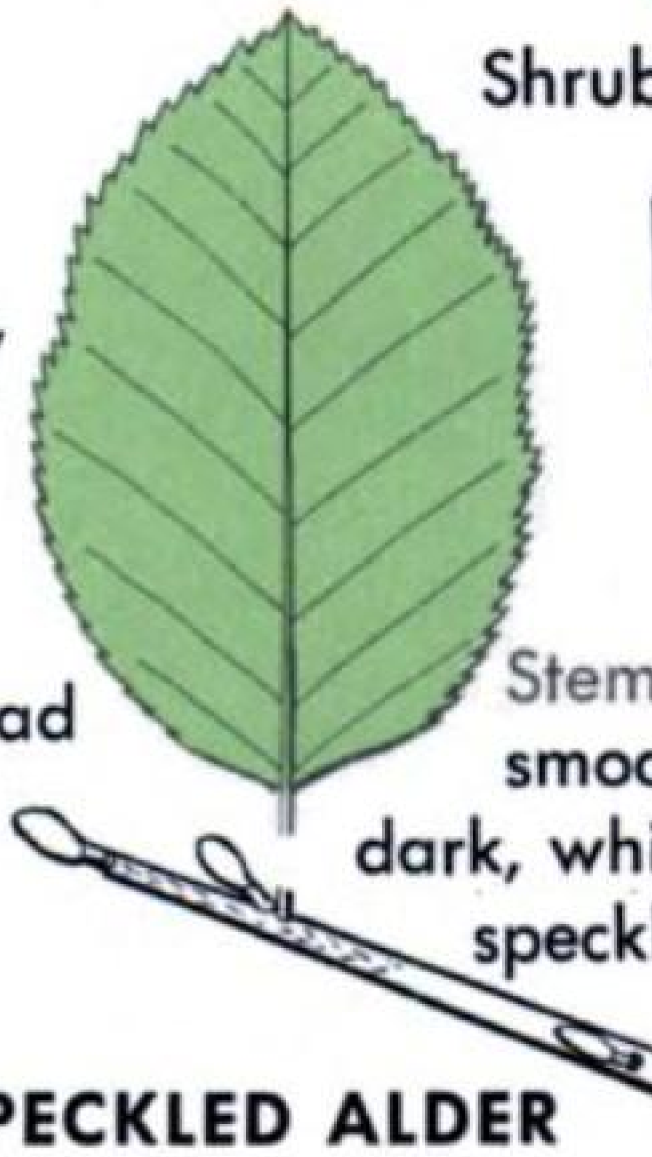
Buds stalked, blunt, rounded, reddish.
End buds true

MOUNTAIN ALDER →



Shrubs





Stems
smooth,
dark, white-
speckled

SPECKLED ALDER

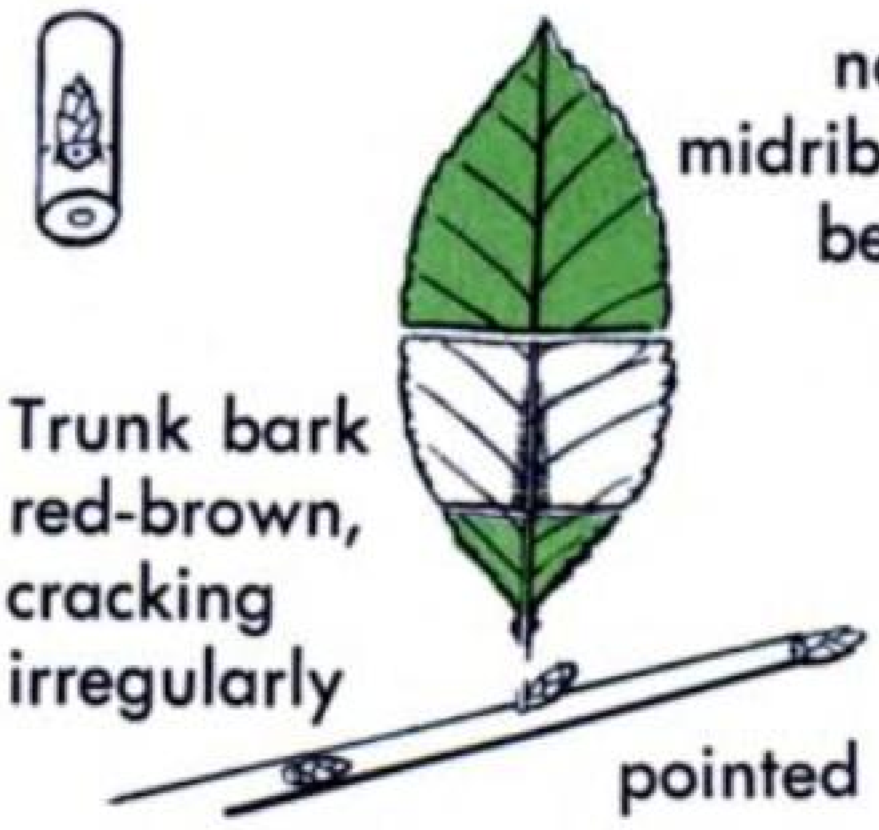
Leaves

narrow, midrib hairy beneath | wide, midrib hairless

Spur branches absent

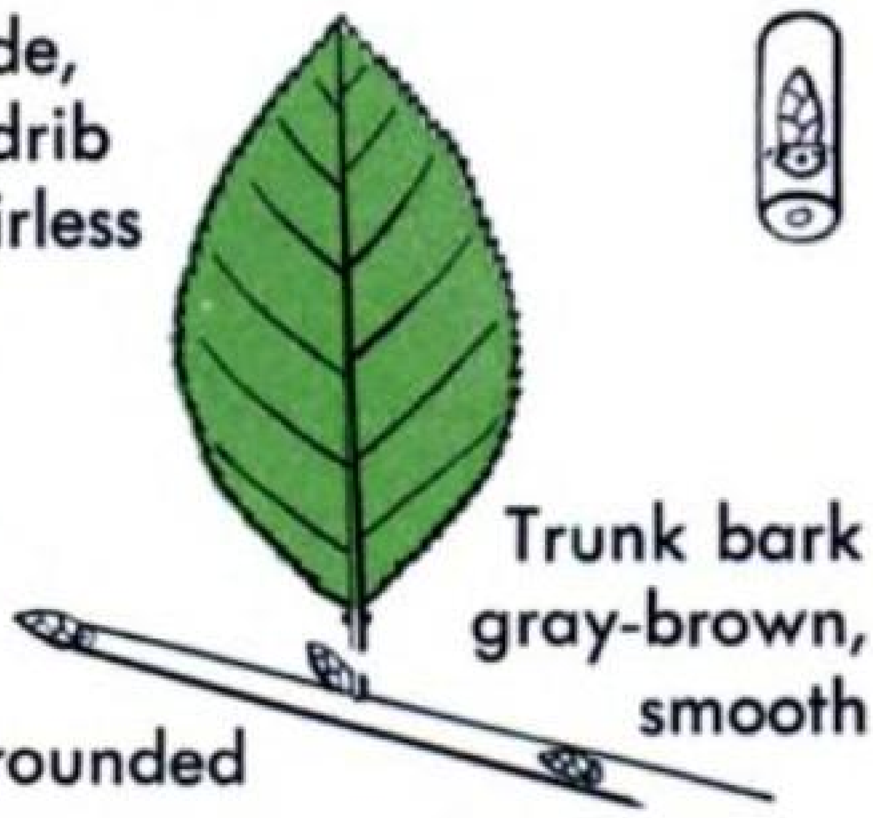
End buds true

Bud scales


Trunk bark red-brown, cracking irregularly

pointed

BLACK CHERRY


Trunk bark gray-brown, smooth

rounded

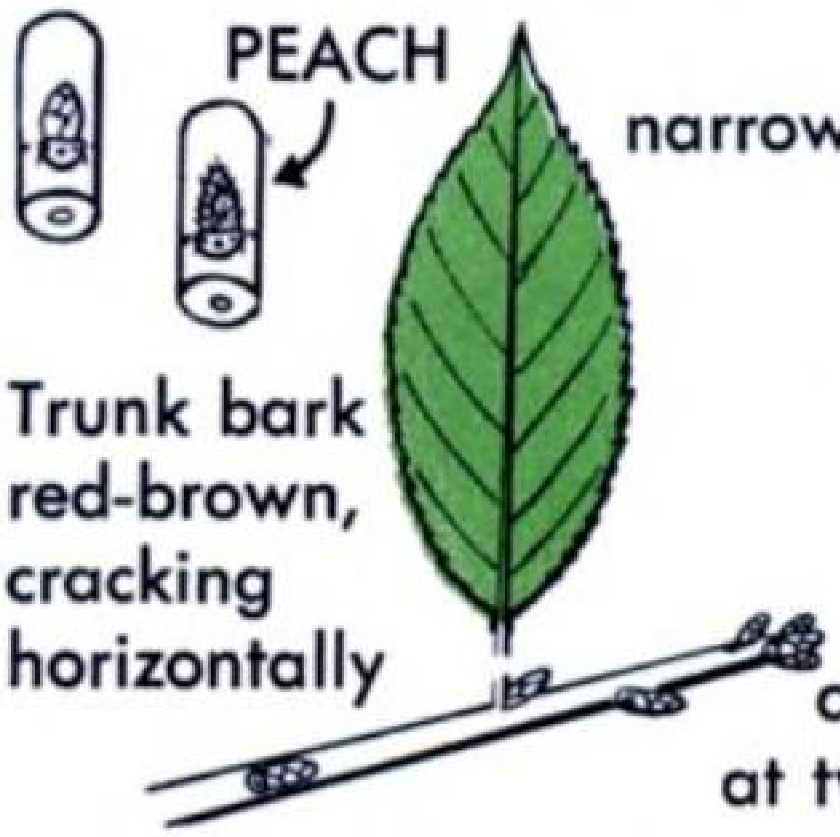
CHOKE CHERRY

Leaves

narrow | wide

Spur branches usually present

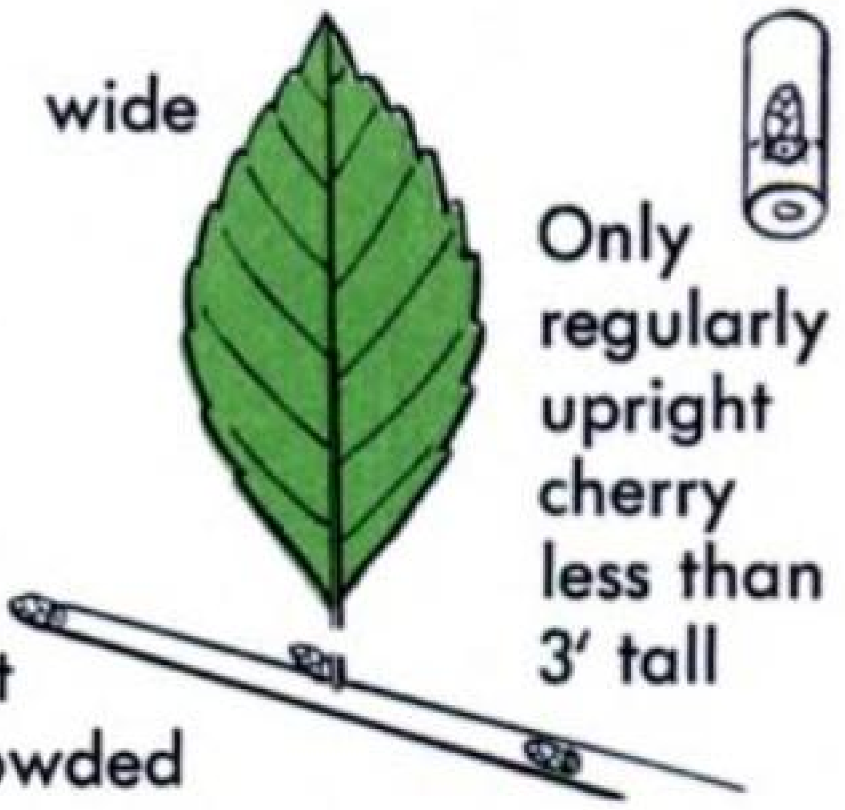
End buds true


PEACH

Trunk bark red-brown, cracking horizontally

crowded at twig tips

FIRE CHERRY


Only regularly upright cherry less than 3′ tall

not crowded

EASTERN DWARF CHERRY

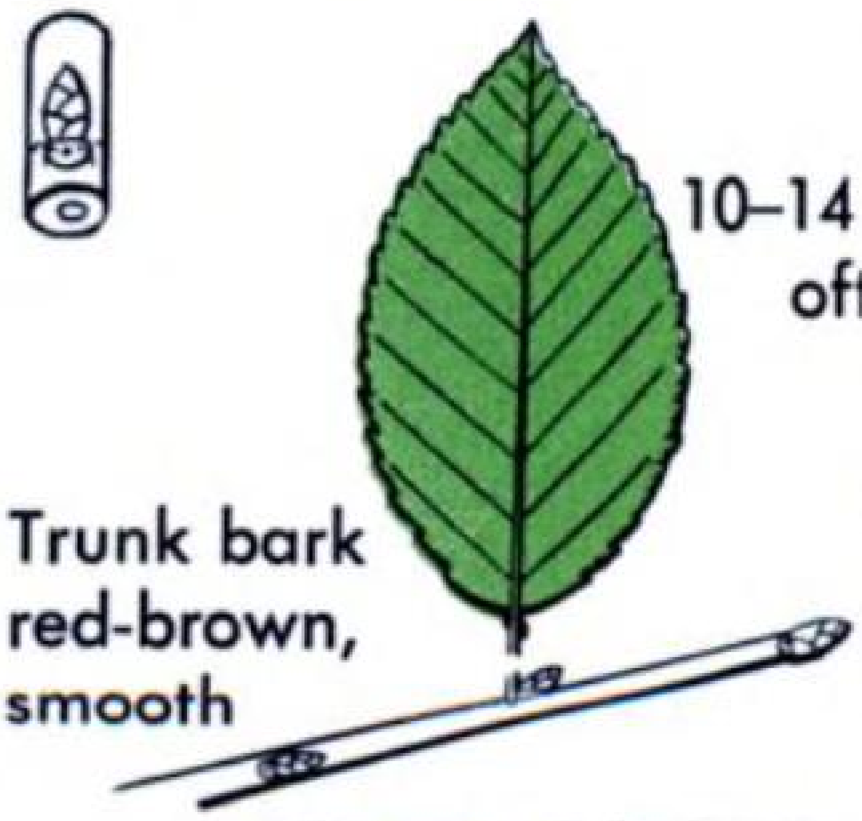
Leaves wide, side veins

10–14 prs. | 6–8 prs.

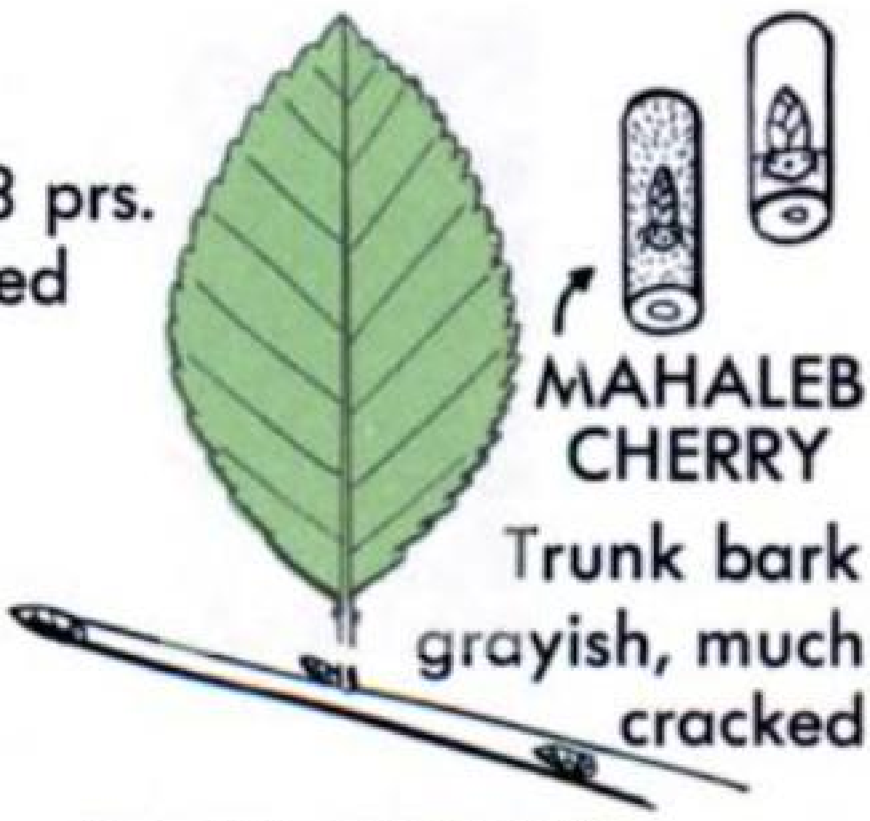
often double-toothed

Spur branches usually present

End buds true


Trunk bark red-brown, smooth

SWEET CHERRY


MAHALEB CHERRY

Trunk bark grayish, much cracked

SOUR CHERRY

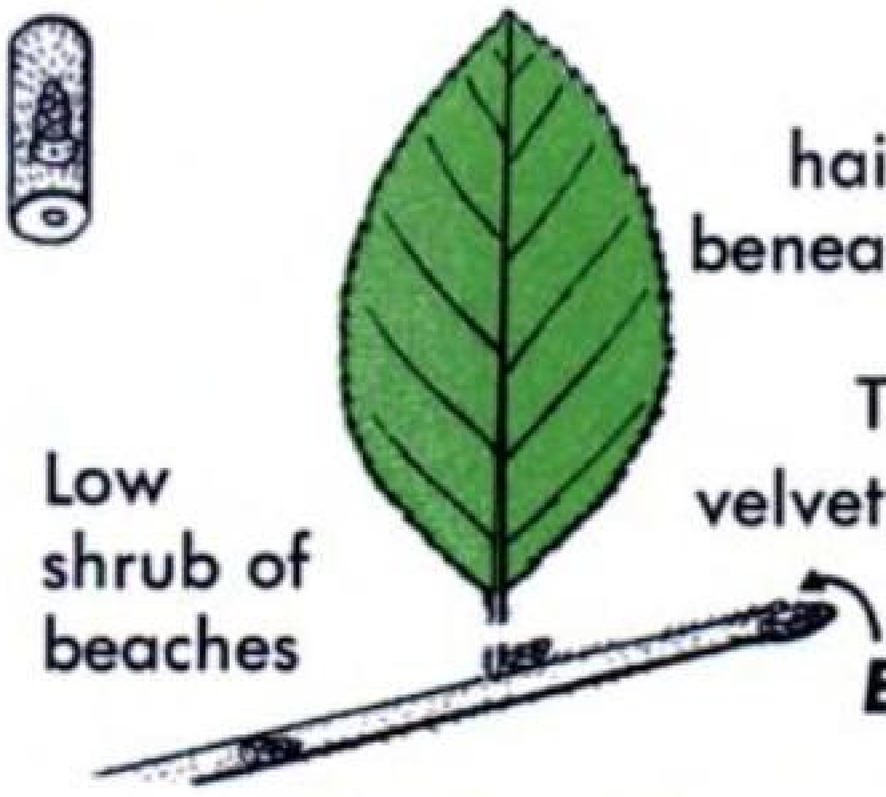
Leaves

hairy beneath | hairless

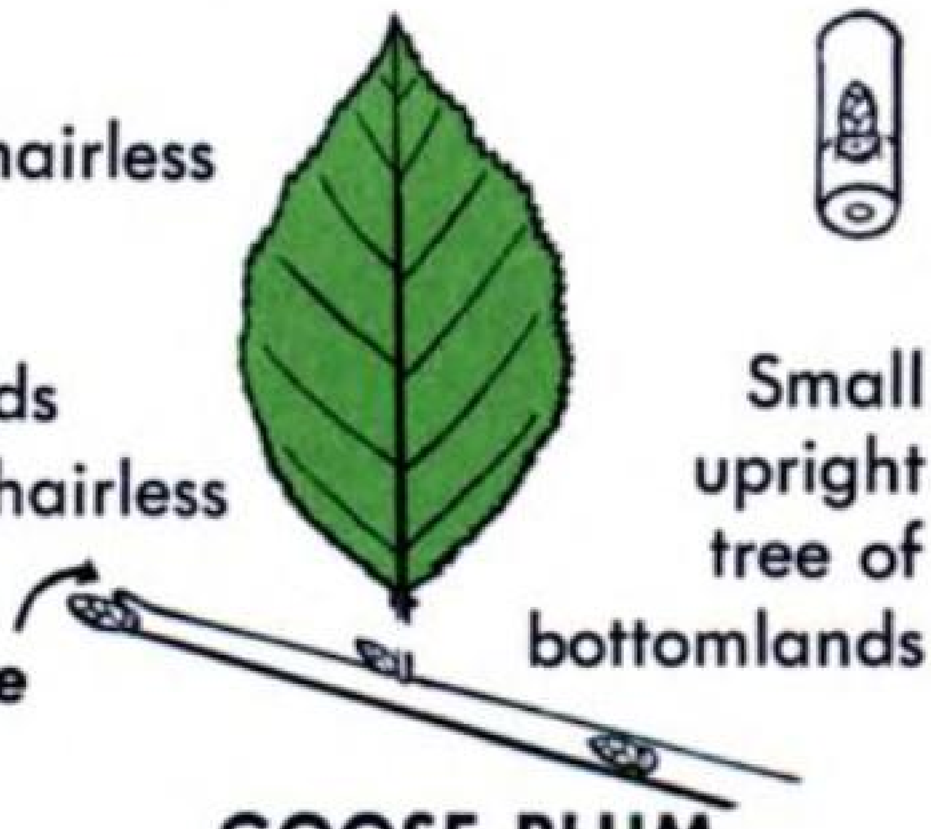
Twigs and buds

velvety | hairless

End buds false

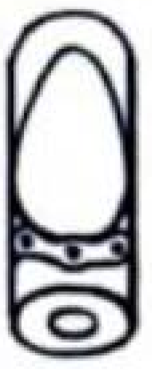

Low shrub of beaches

BEACH PLUM


Small upright tree of bottomlands

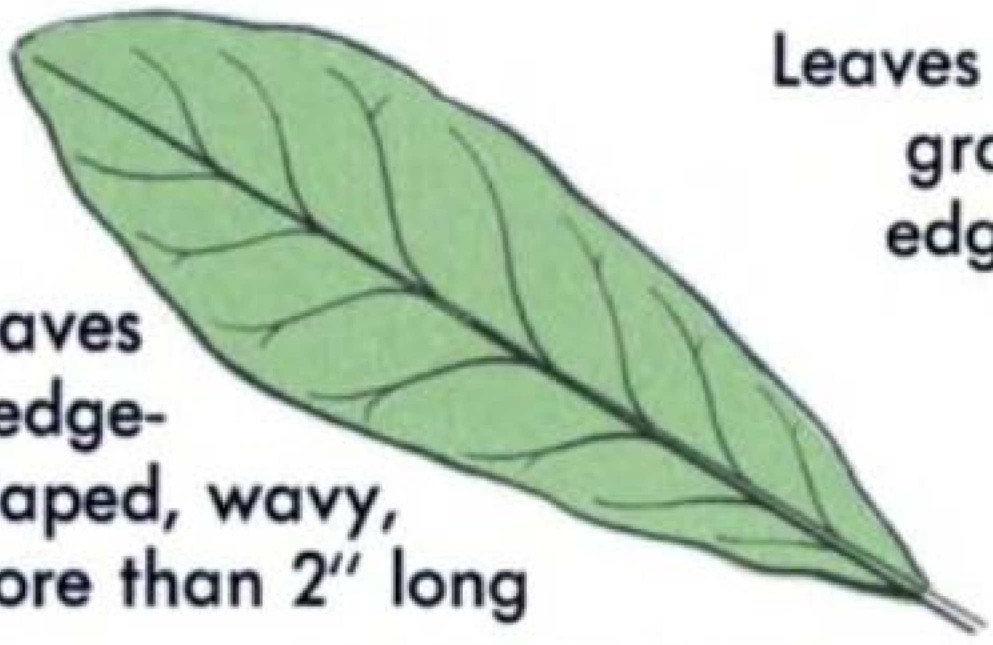
GOOSE PLUM

Leaves not toothed, gray-hairy, at least beneath



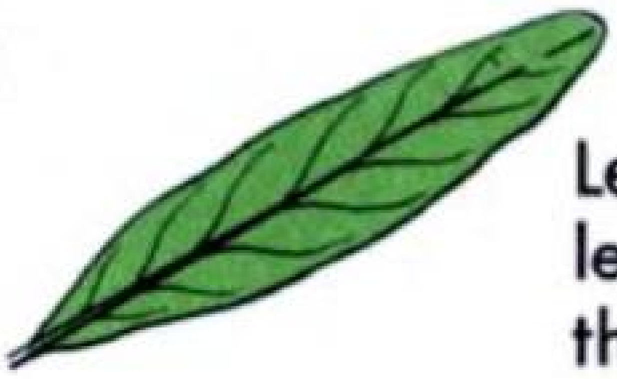
Typical willow twig

Leaves not toothed, gray-hairy, edges rolled



Leaves wedge-shaped, wavy, more than 2″ long

TALL PRAIRIE



Leaves less than 2″ long

DWARF PRAIRIE

Leaves

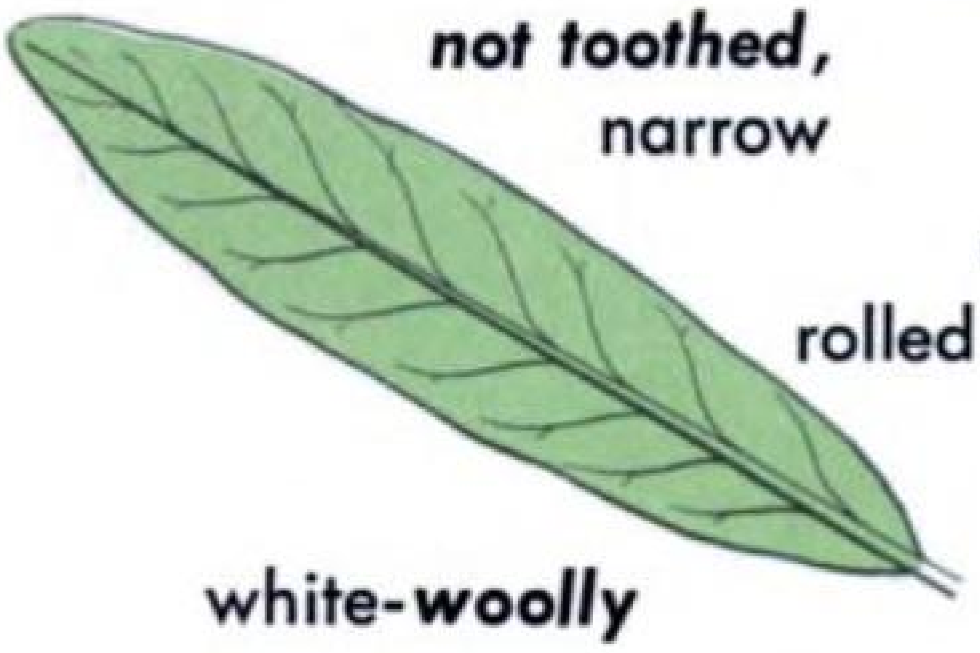
not toothed, narrow

toothed, wide

edges

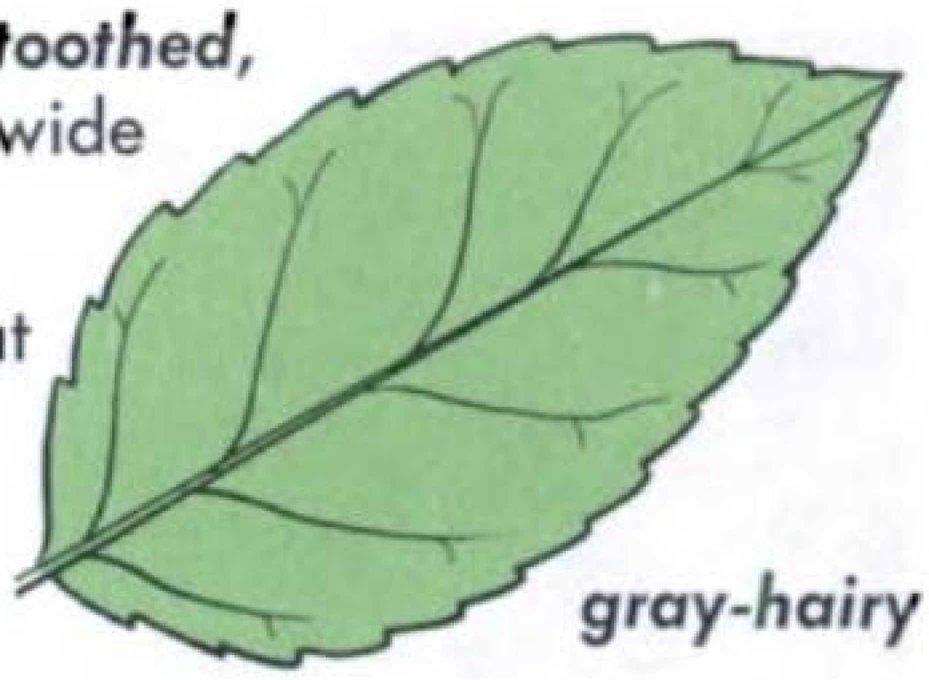
rolled

flat



white-***woolly***

HOARY

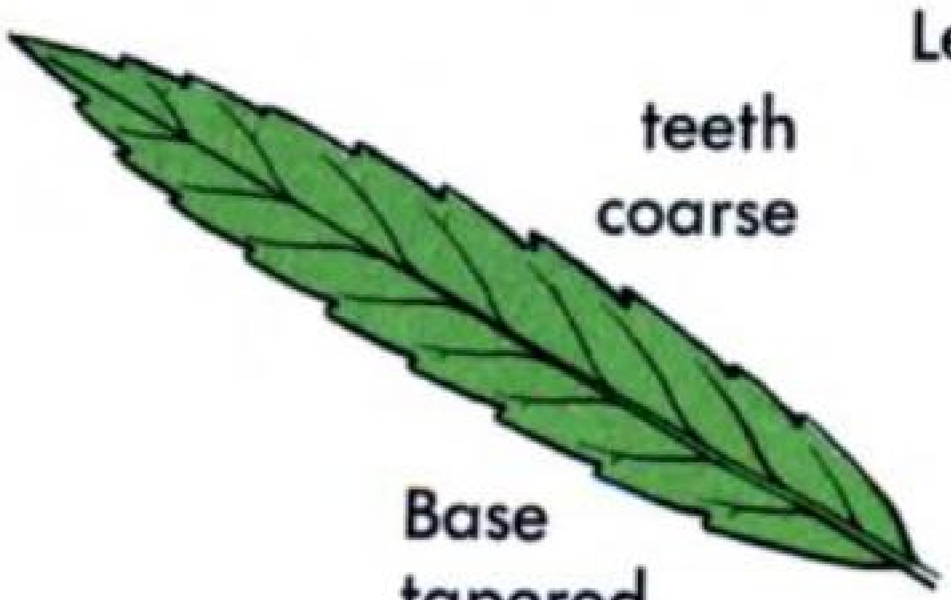


gray-hairy

BEBB

Leaves toothed, hairless or slightly silky, green beneath

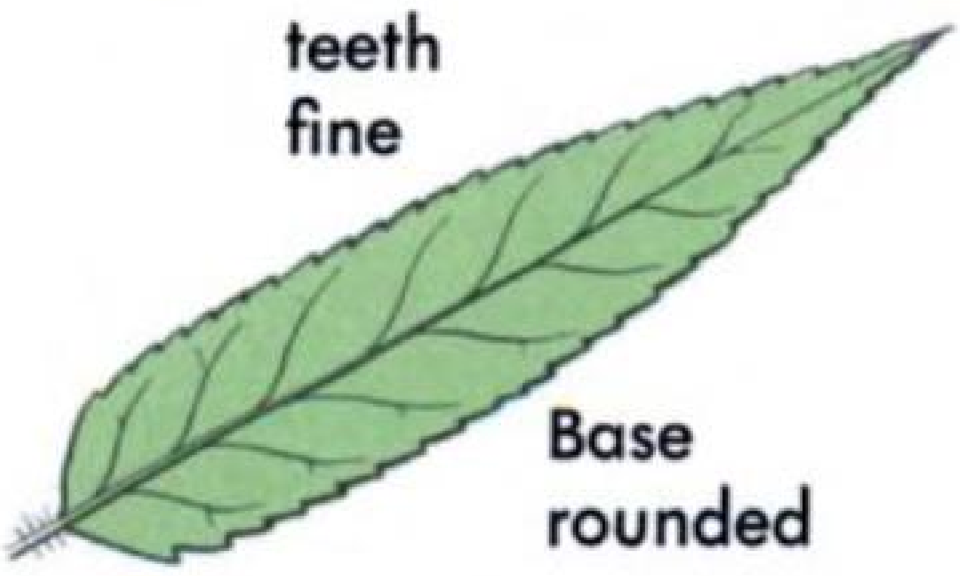
Leaves narrow



teeth coarse

Base tapered

SANDBAR



teeth fine

Base rounded

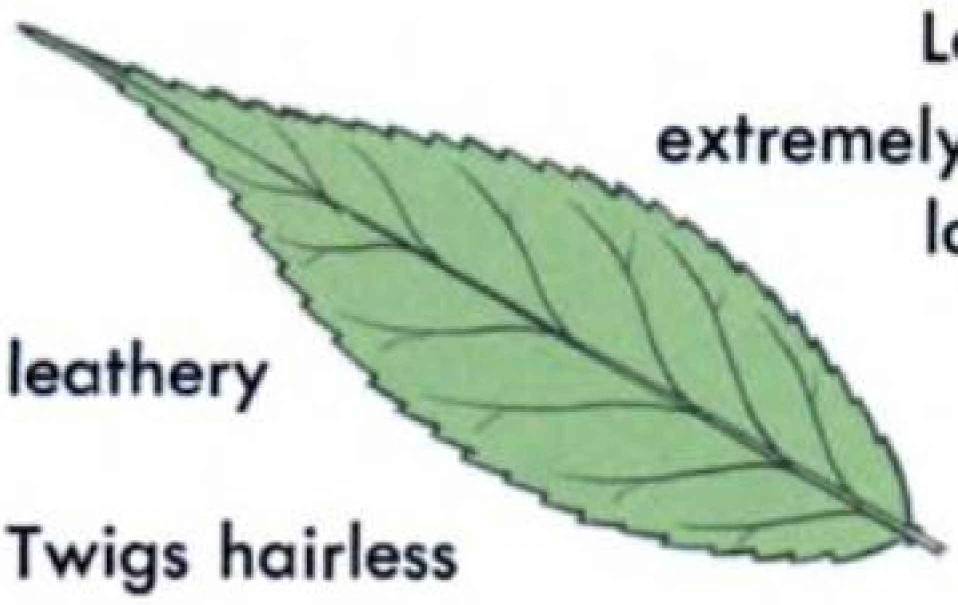
BLACK

Leaves wider

extremely

moderately

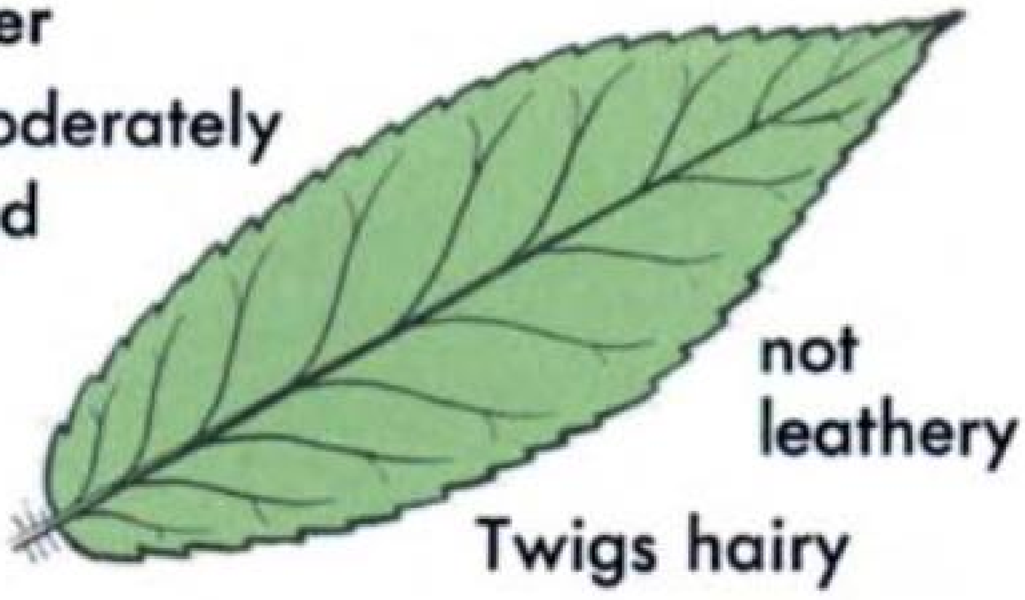
long-pointed



leathery

Twigs hairless

SHINING



not leathery

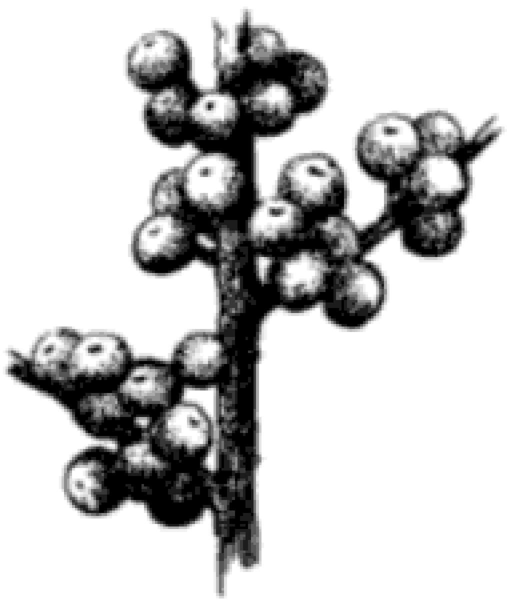
Twigs hairy

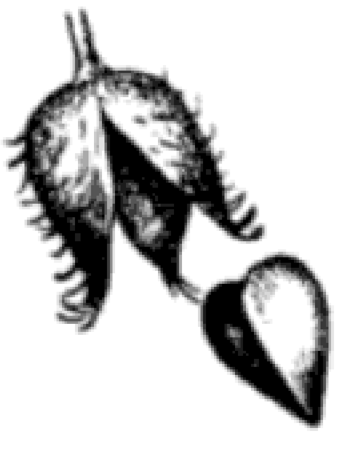
HEARTLEAF

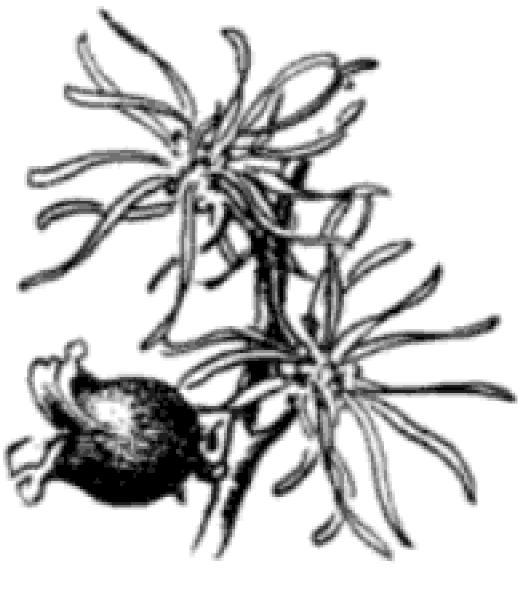
MISCELLANEOUS PLANTS WITH 3 BUNDLE SCARS (1)

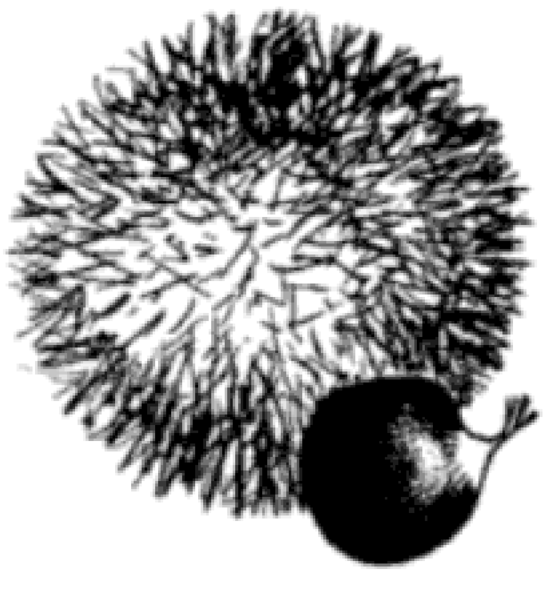
"Bundle scars" are small marks within a leaf scar (see p. xxiv). The leaves of these plants are mostly toothed or wavy-edged.

- ψ SWEETGALE, *Myrica gale* p. 262
  Swamps; Newfoundland, Labrador, and Alaska to n. New Jersey, e. Pennsylvania, Michigan, Minnesota, and Oregon; in mts. to N. Carolina and Tennessee.
- ψ COMMON WAXMYRTLE, *Myrica cerifera* p. 262
  Coastal Plain, sandy and gravelly soils; s. New Jersey to Florida, west to e. Texas, and north to Oklahoma and Arkansas.
  - ψ DWARF WAXMYRTLE, *M. pusilla* (not illus.) p. 262
- ψ NORTHERN BAYBERRY, *Myrica pensylvanica* p. 262
  Poor soils, mostly near coast and Great Lakes; s. Newfoundland, e. New Brunswick, and n. Ohio to N. Carolina.
  - ψ BLACK BAYBERRY, *M. heterophylla* (not illus.) p. 263
- ψ SWEETFERN, *Comptonia peregrina* p. 263
  Dry soils; Nova Scotia and Manitoba to Virginia, W. Virginia, Ohio, nw. Indiana, ne. Illinois, and Minnesota; in mts. to n. Georgia.
- ↑ BEECH, *Fagus grandifolia* p. 263
  Rich mature soils; Nova Scotia, Prince Edward I., s. Ontario, and e. Wisconsin to n. Florida and Texas.
- ↑ψ COMMON WITCH-HAZEL, *Hamamelis virginiana* p. 263
  Woods; Nova Scotia, s. Ontario, centr. Michigan, and se. Minnesota to centr. Florida and e. Texas.
  - ψ SPRINGTIME WITCH-HAZEL p. 264
    H. vernalis (not illus.)
  - ψ WITCH-ALDER, *Fothergilla gardeni* (not illus.) p. 264
- ↑ CHESTNUT, *Castanea dentata* p. 264
  Well-drained forests; s. Maine, New York, s. Ontario, and s. Michigan to Georgia and ne. Mississippi.
  - ↑ψ EASTERN CHINQUAPIN, *C. pumila* (not illus.) p. 265
  - ↑ OZARK CHINQUAPIN, *C. ozarkensis* (not illus.) p. 265


BAYBERRY


BEECH


WITCH-HAZEL


CHESTNUT

MISCELLANEOUS PLANTS WITH 3 BUNDLE SCARS (2)

"Bundle scars" are small marks within a leaf scar (see p. xxiv).

↑Ψ RED CHOKEBERRY, *Pyrus arbutifolia* p. 266
Wet or dry thickets; Nova Scotia, s. Ontario, Michigan, and Missouri to Florida and e. Texas.
Ψ PURPLE CHOKEBERRY, *P. floribunda* (not illus.) p. 266

Ψ BLACK CHOKEBERRY, *Pyrus melanocarpa* p. 266
Wet or dry thickets; Newfoundland, nw. Ontario, and Minnesota to S. Carolina and Tennessee.

Ψ ALDERLEAF BUCKTHORN, *Rhamnus alnifolia* p. 266
Thickets and woods; Newfoundland and British Columbia to n. New Jersey, W. Virginia, n. Indiana, n. Illinois, Minnesota, Nebraska, Wyoming, and California.
Ψ LANCELEAF BUCKTHORN p. 267
R. lanceolata (leaf & twig illus.)
Thickets; s.-centr. Pennsylvania, W. Virginia, s. Ohio, s. Wisconsin, and Nebraska to Alabama and Texas.

↑Ψ CAROLINA BUCKTHORN, *Rhamnus caroliniana* p. 267
Woods; w. Virginia, W. Virginia, s. Ohio, s. Illinois, Missouri, and Nebraska to Florida and Texas.
Ψ EUROPEAN BUCKTHORN, *R. frangula* (leaf illus.) p. 267
Thickets; Nova Scotia, s. Quebec, s. Ontario, and Minnesota to New Jersey, Ohio, and Illinois.

↑ DOMESTIC APPLE, *Pyrus malus* p. 267
Spread from cultivation; throughout our area in the U.S. and s. Canada.
↑ CHINESE APPLE, *P. prunifolia* (not illus.) p. 268
↑ SIBERIAN CRABAPPLE, *P. baccata* (not illus.) p. 268
↑ DOMESTIC PEAR p. 268
P. communis (leaf & twig illus.)
Spread from cultivation; ne. U.S. and s. Canada.
↑ CHINESE PEAR, *P. pyrifolia* (not illus.) p. 268

Ψ GROUNDSEL-TREE, *Baccharis halimifolia* p. 268
Coastal salt marshes and adjacent areas; e. Massachusetts to Florida and s. Texas.

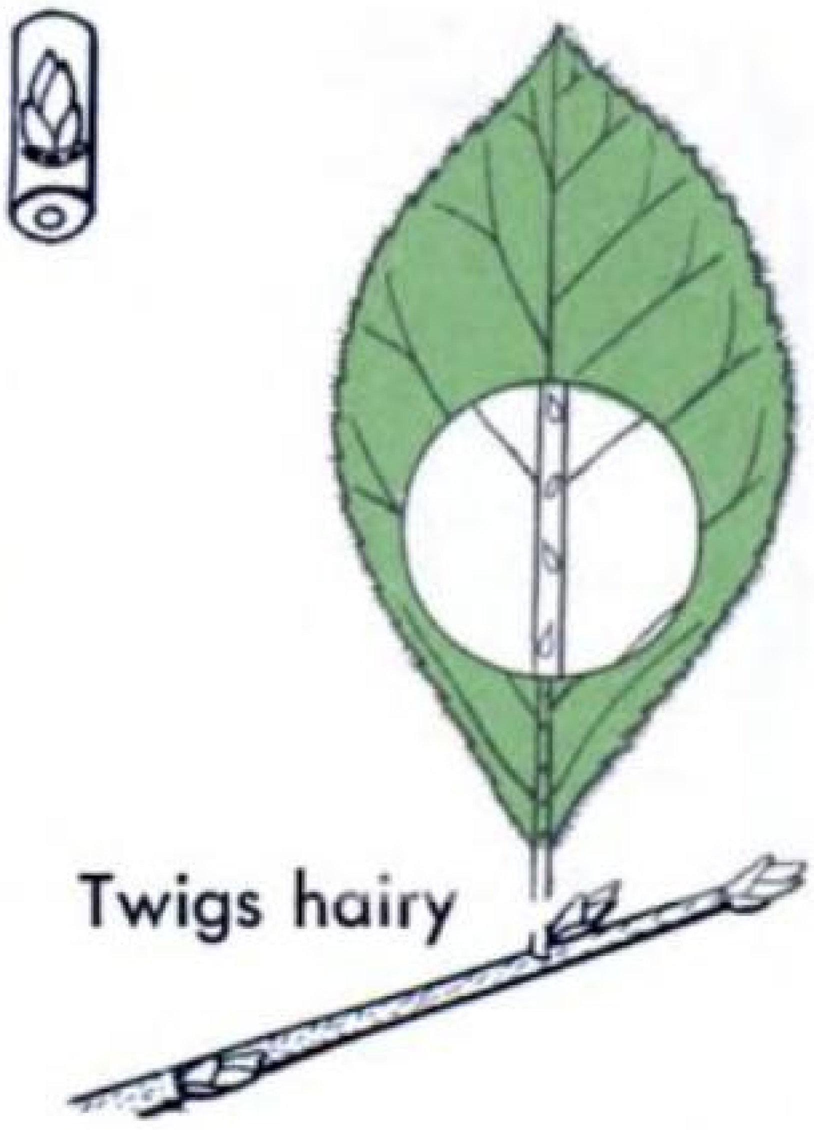
Fruits of typical **CHOKEBERRY** (left) and **BUCKTHORN** (right)

Leaves with glands along top of midrib
(use lens)

hairy beneath — hairless

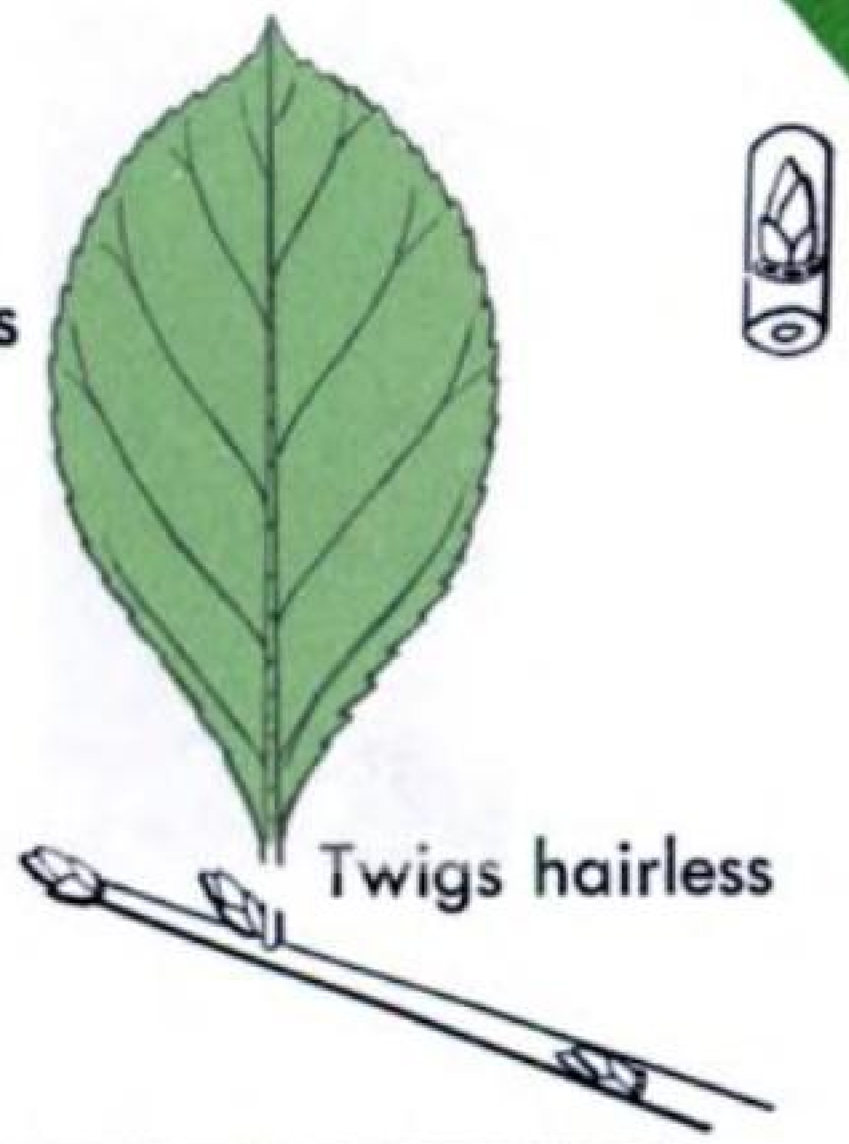
always toothed

Buds reddish, scaly. Scale tips notched



Twigs hairy

RED CHOKEBERRY



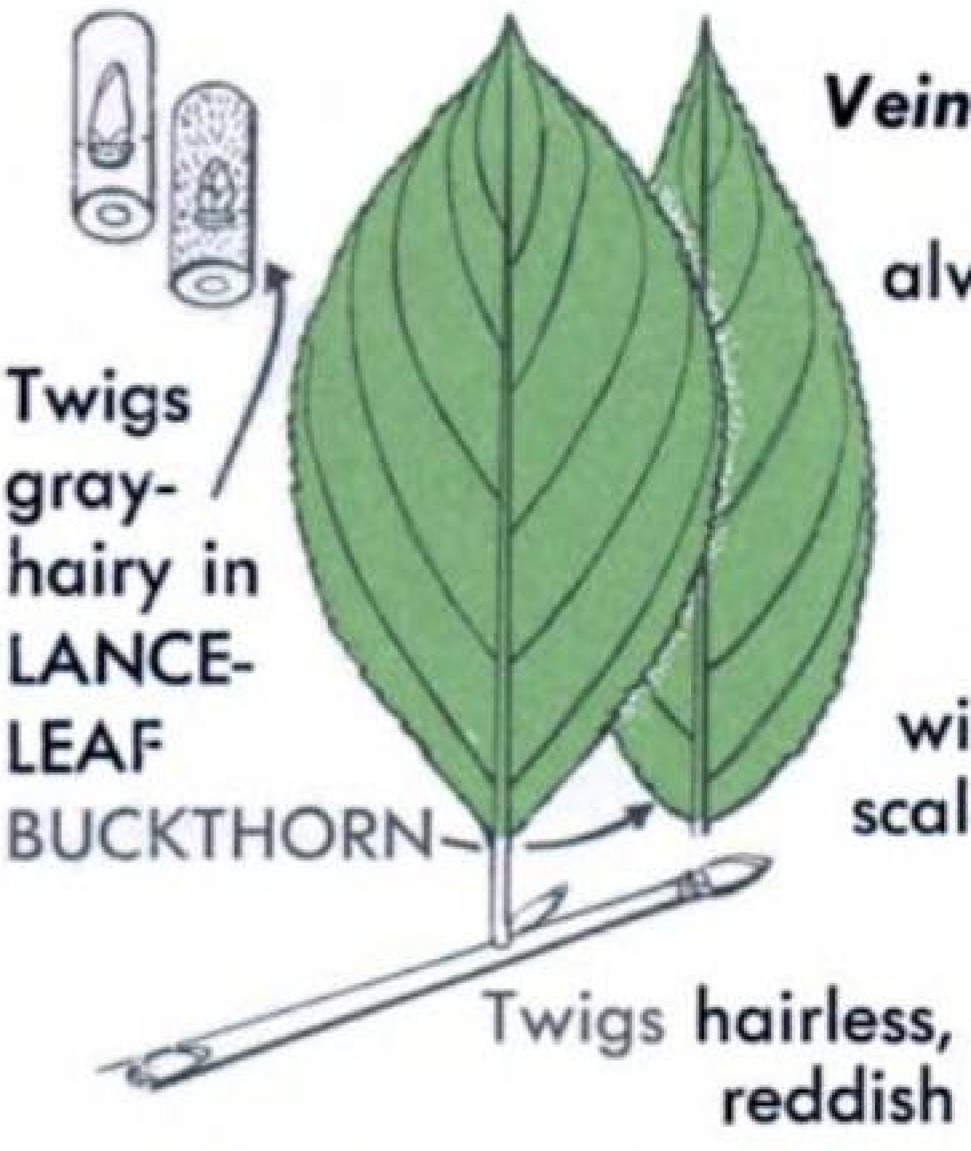
Twigs hairless

BLACK CHOKEBERRY

Veins tend to follow leaf edges

always — often
toothed

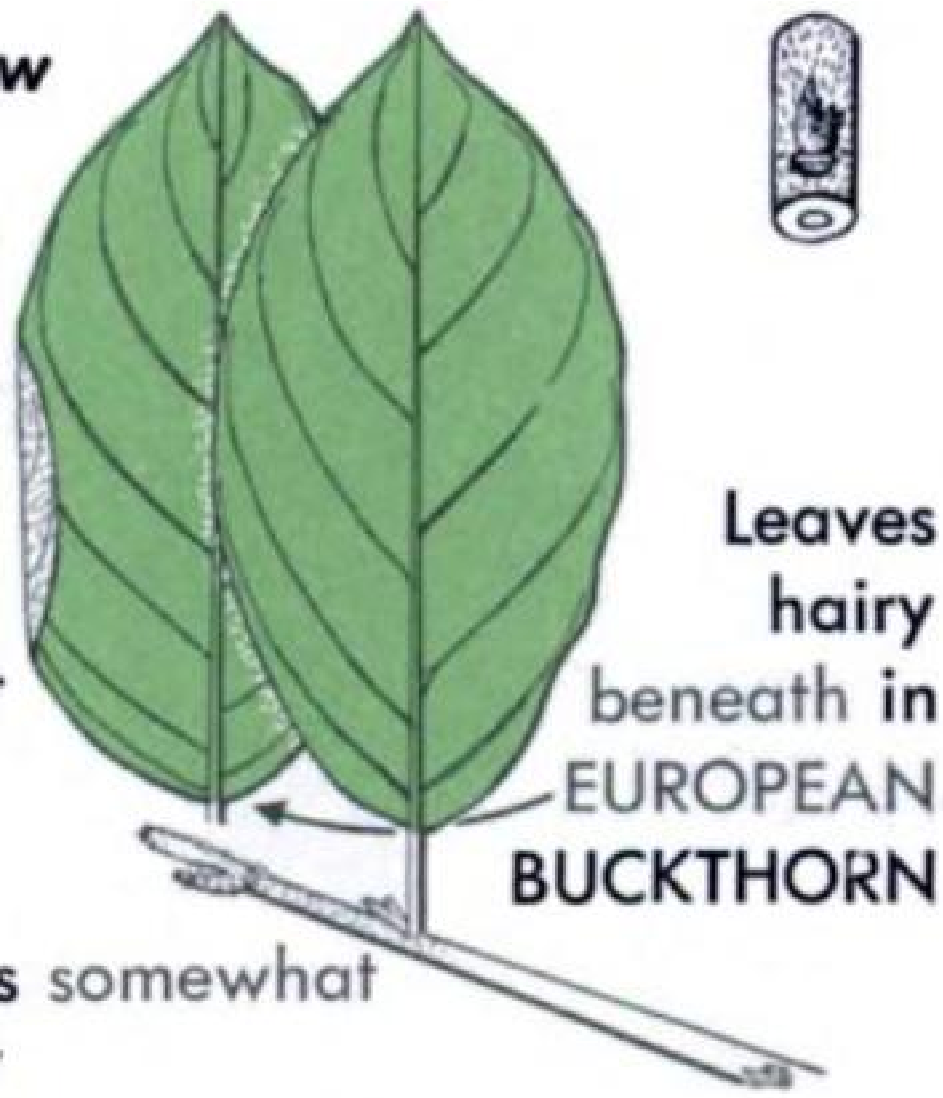
Buds dark
with — without
scales — scales



Twigs gray-hairy in LANCE-LEAF BUCKTHORN

Twigs hairless, reddish

ALDERLEAF BUCKTHORN



Leaves hairy beneath in EUROPEAN BUCKTHORN

Twigs somewhat hairy

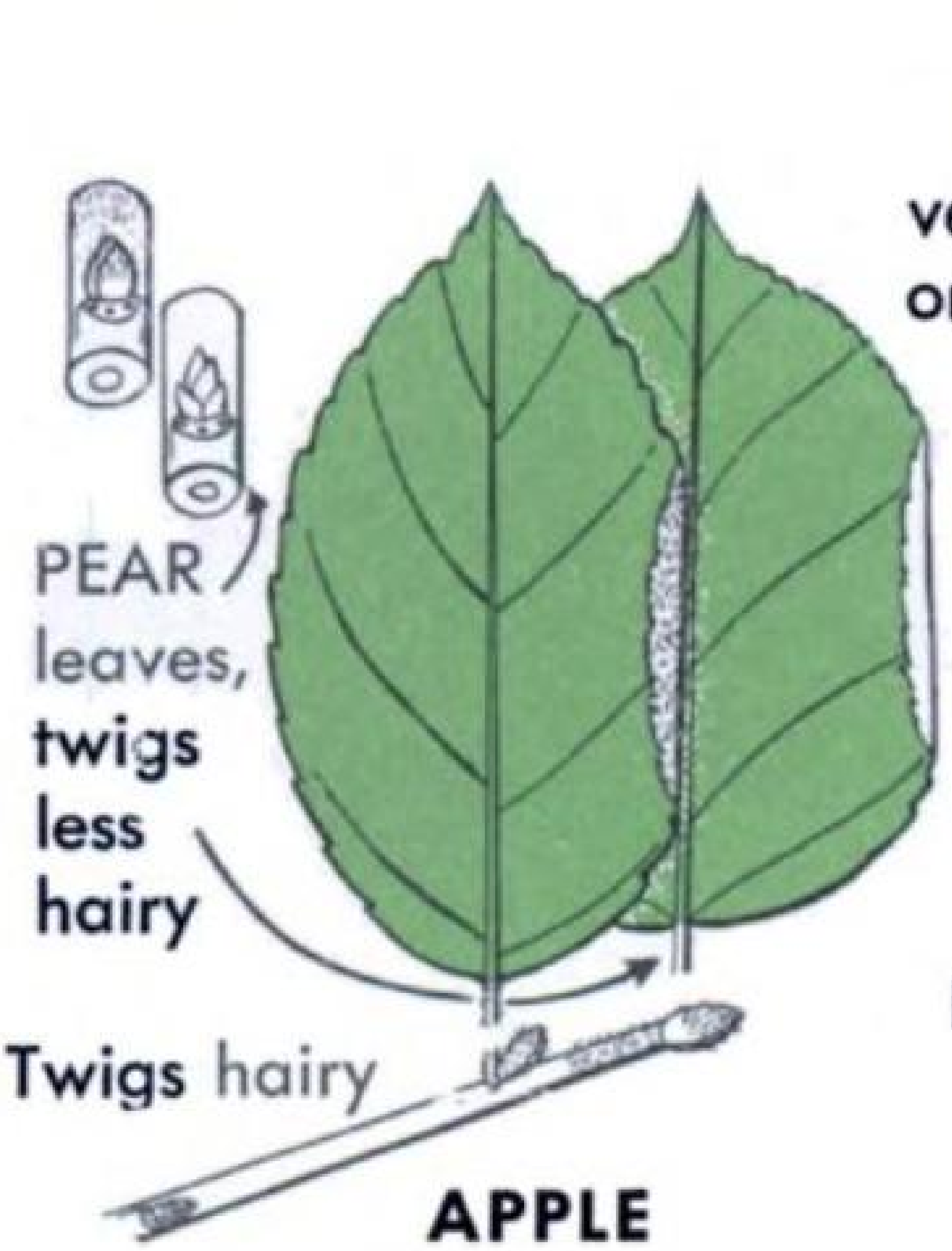
CAROLINA BUCKTHORN

Leaves toothed or not

very hairy or hairless — hairless

Spurs often present — ***Near ocean only***

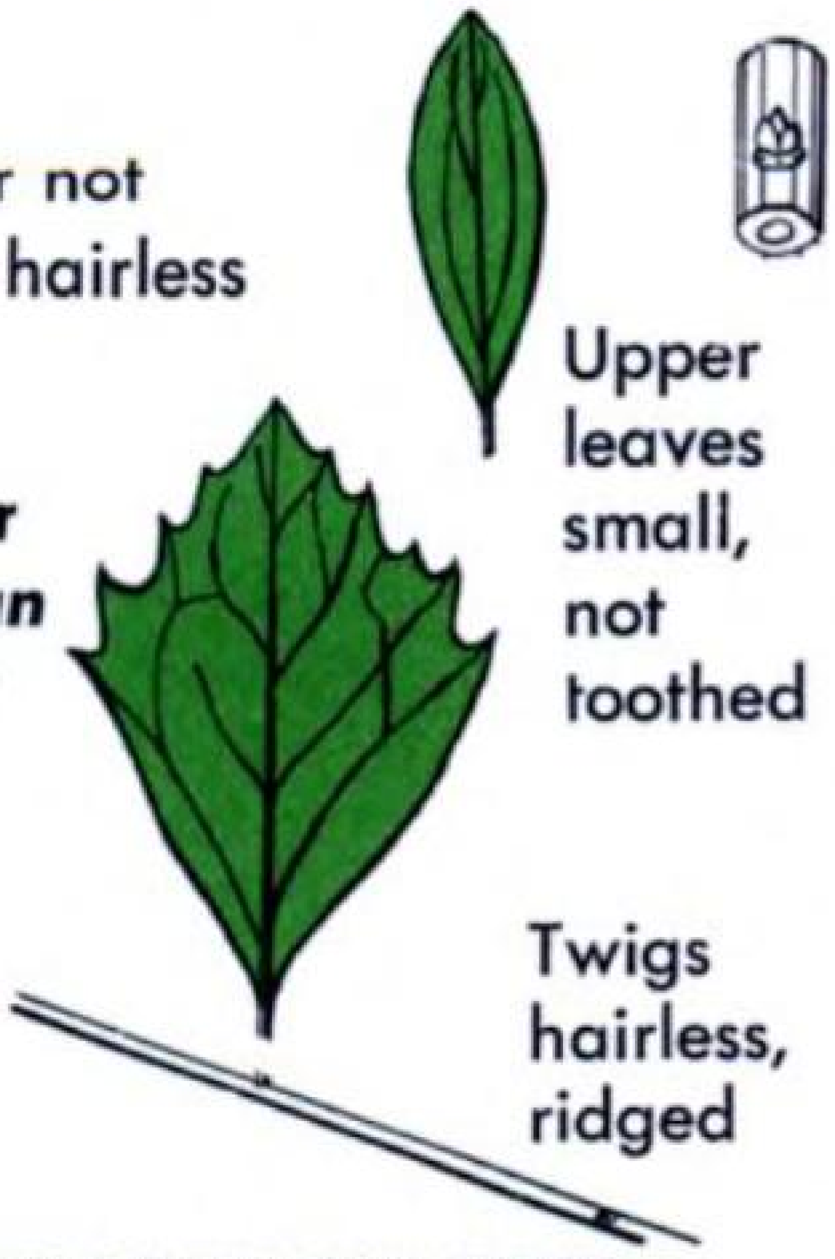
Buds dark, scaly



PEAR leaves, twigs less hairy

Twigs hairy

APPLE



Upper leaves small, not toothed

Twigs hairless, ridged

GROUNDSEL-TREE

MISCELLANEOUS PLANTS WITH 3 (OR MORE) BUNDLE SCARS (3)

All but the top 2 plants have 3 bundle scars; all but 1 have leaves that are never toothed.

Ψ LEATHERWOOD, *Dirca palustris* p. 269
Rich woods; New Brunswick, Ontario, and Minnesota to n. Florida and Louisiana.

↟Ψ TALL PAWPAW, *Asimina triloba* p. 269
Bottomlands; New Jersey, w. New York, s. Ontario, s. Michigan, se. Iowa, and se. Nebraska to n. Florida and e. Texas.
Ψ DWARF PAWPAW, *A. parviflora* (not illus.) p. 270

↟ SOUR-GUM, *Nyssa sylvatica* p. 270
Lowlands and swamps; centr. Maine, s. Ontario, s. Michigan, and centr. Missouri to Florida and e. Texas.
↟ TUPELO, *N. aquatica* (not illus.) p. 270

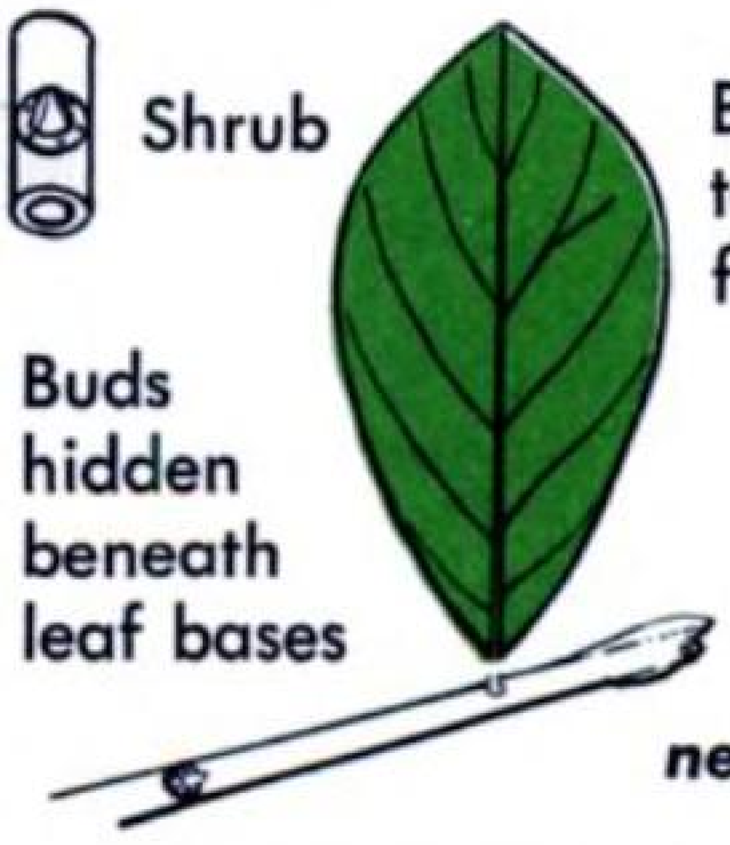
Ψ SWEET-SPIRES, *Itea virginica* p. 271
Swamps and wet ground; Florida and Texas north along coast to New Jersey and e. Pennsylvania; in Mississippi Valley to Kentucky, s. Illinois, Missouri, and Oklahoma.

Ψ COMMON SPICEBUSH, *Lindera benzoin* p. 271
Wooded bottomlands; sw. Maine, s. Ontario, s. Michigan, Iowa, and se. Kansas to Florida and Texas.
Ψ HAIRY SPICEBUSH, *L. melissaefolium* (not illus.) p. 271

↟Ψ ALTERNATE-LEAF DOGWOOD p. 271
Cornus alternifolia
Upland woods; Newfoundland, s. Ontario, se. Manitoba, and e. Minnesota to nw. Florida, Alabama, and n. Arkansas.

↟Ψ SMOKETREE, *Cotinus obovatus* p. 272
Limestone woods and cliffs in 3 scattered localities; s.-centr. Tennessee to nw. Alabama, sw. Missouri, and nw. Arkansas to e. Oklahoma and s.-centr. Texas. Also reported in Davies County, Kentucky.

↟Ψ CORKWOOD, *Leitneria floridana* p. 272
Swamps in scattered localities; se. Georgia and n. Florida, e. Texas and se. Arkansas; and ne. Arkansas and s. Missouri.



Shrub

Bark very tough and fibrous

Buds hidden beneath leaf bases

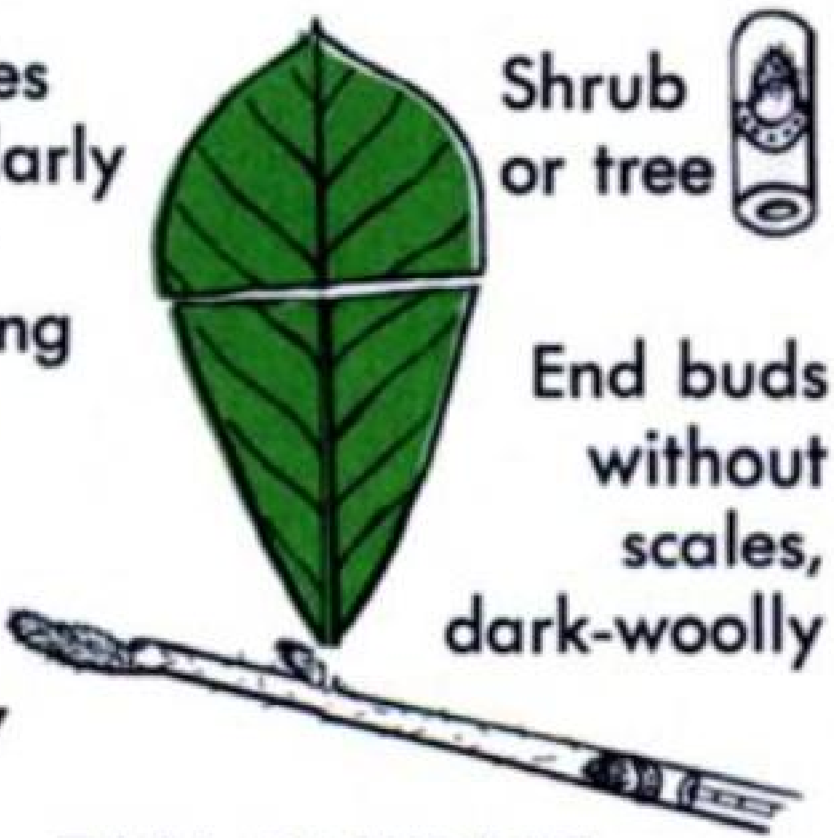
LEATHERWOOD

Pith

never

frequently

chambered

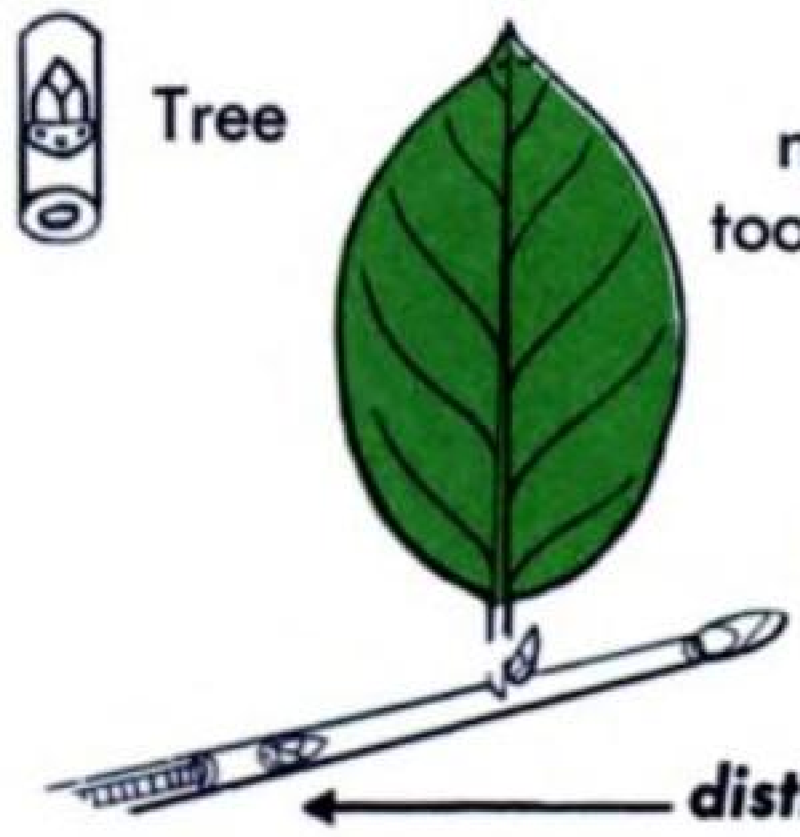


Leaves regularly over 6″ long

Shrub or tree

End buds without scales, dark-woolly

TALL PAWPAW



Tree

Leaves

never toothed

always toothed

Twigs

brown

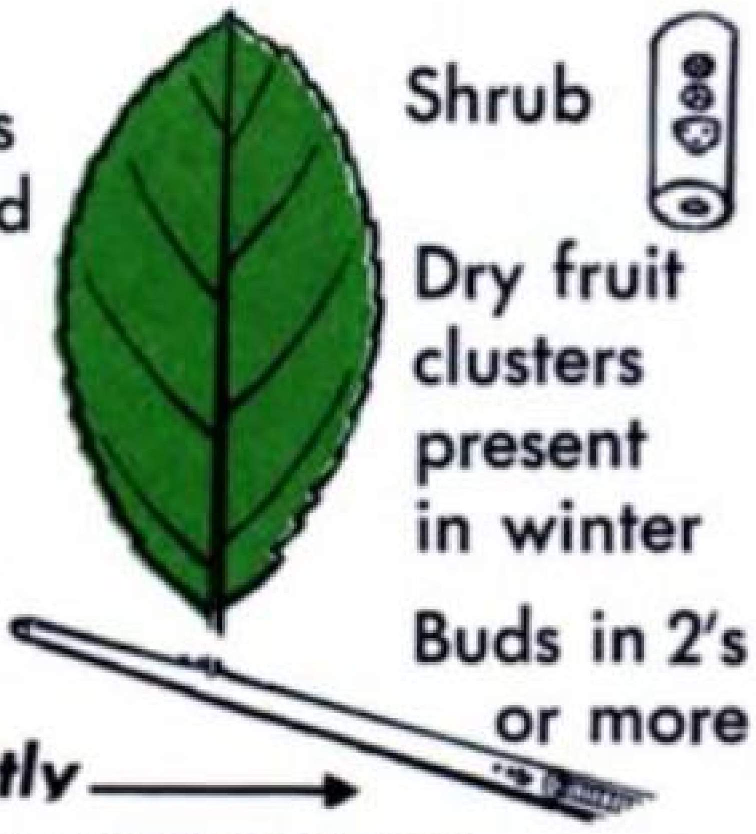
green

Pith chambered

← *distinctly*

sometimes faintly →

SOUR-GUM

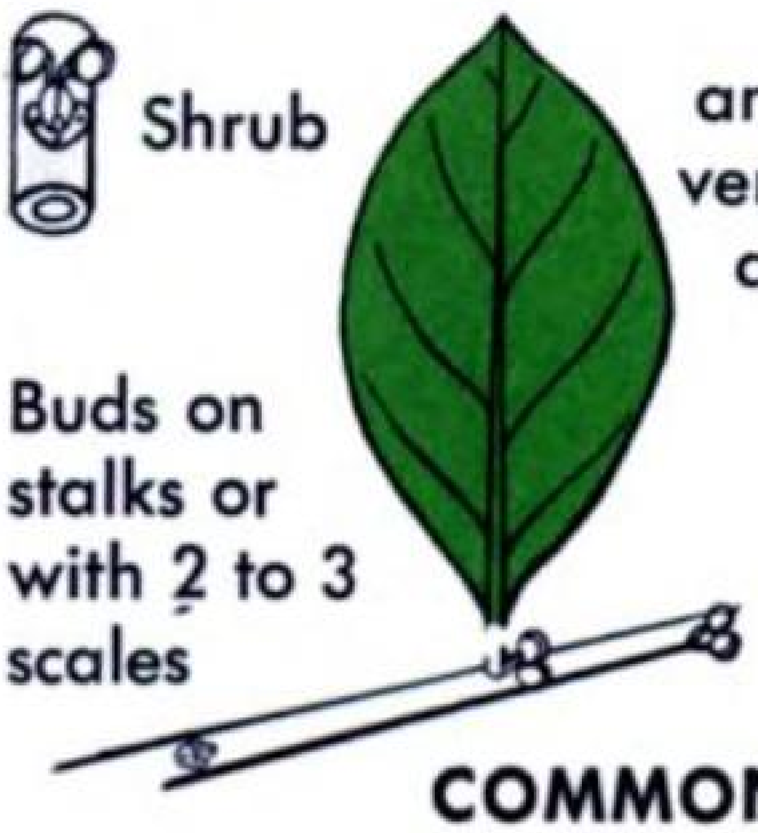


Shrub

Dry fruit clusters present in winter

Buds in 2's or more

SWEET-SPIRES



Shrub

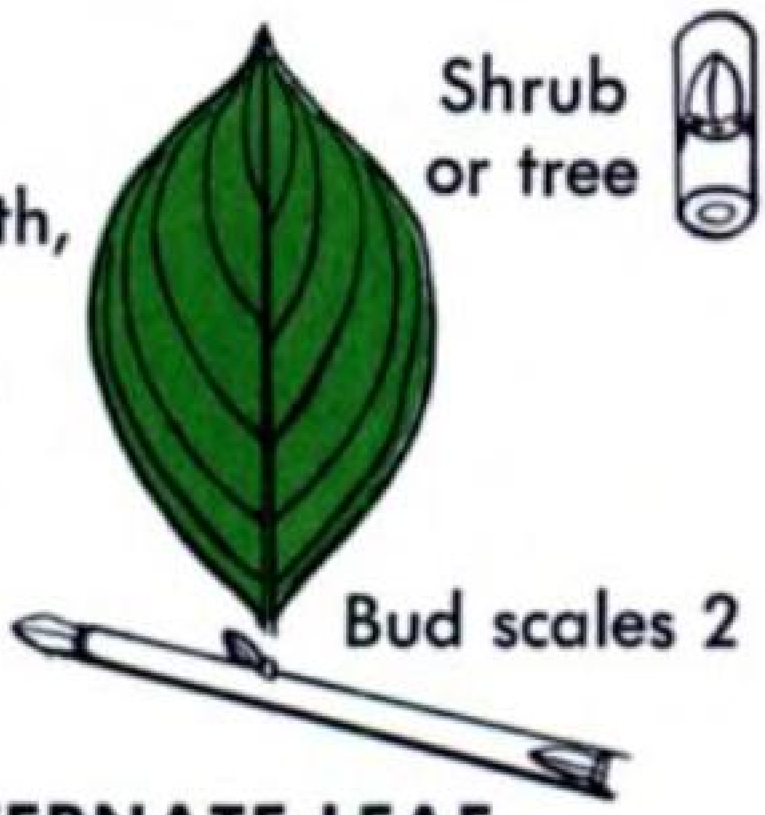
Leaves

and twigs very spicy, aromatic

Buds on stalks or with 2 to 3 scales

COMMON SPICEBUSH

Pith not chambered

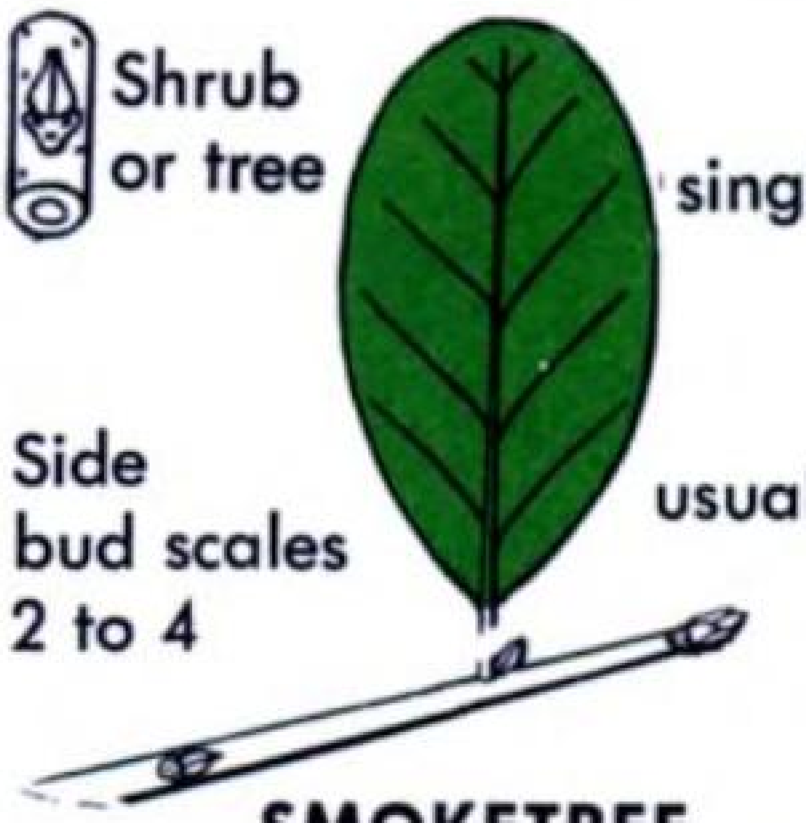


hairy beneath, veins follow edges

Shrub or tree

Bud scales 2

ALTERNATE-LEAF DOGWOOD



Shrub or tree

End buds

single

clustered

Side bud scales 2 to 4

Side buds

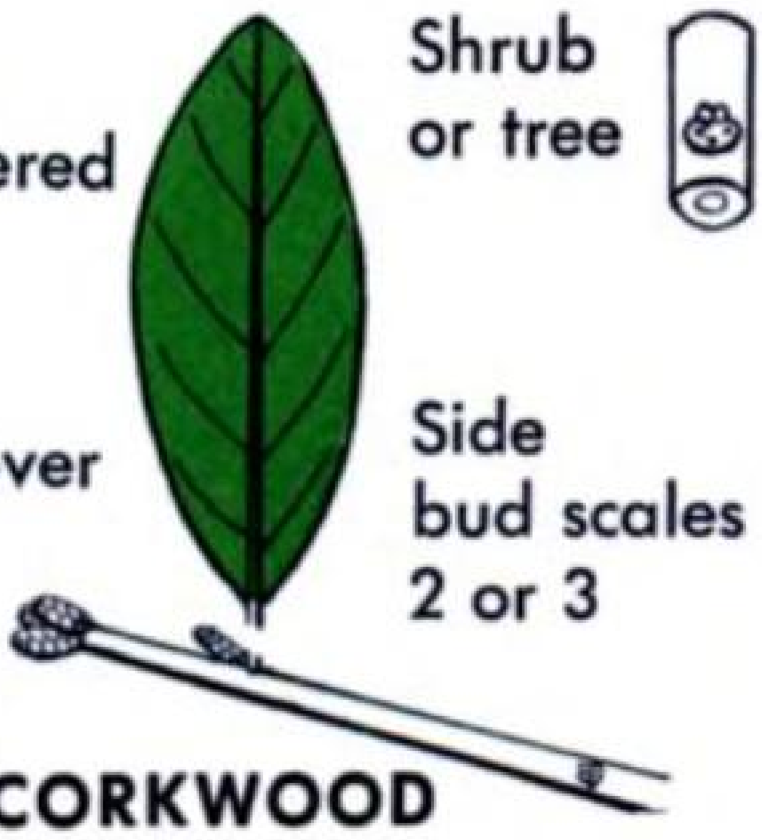
usually

never

long-pointed

Pith not chambered

SMOKETREE



Shrub or tree

Side bud scales 2 or 3

CORKWOOD

SPIREAS

Shrubs generally with toothed leaves, papery bark, raised leaf scars. Umbrella- or cone-like heads of small dry fruits usually present.

V STEEPLEBUSH SPIREA, *Spiraea tomentosa* p. 273
Moist meadows; Prince Edward I., e. Quebec, s. Ontario, and Manitoba, to e. Virginia, n. Georgia, Tennessee, and Arkansas.

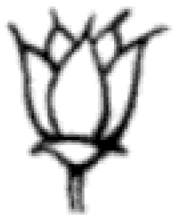
V NARROWLEAF SPIREA (MEADOWSWEET) p. 273
Spiraea alba
Damp meadows; nw. Vermont, sw. Quebec, and Saskatchewan to Delaware, w. N. Carolina, Ohio, n. Missouri, and N. Dakota.

V BROADLEAF SPIREA (MEADOWSWEET) p. 273
Spiraea latifolia
Damp meadows and tundras; Newfoundland, s. Labrador, n. Quebec, and Michigan to Long Island, New York, and interior N. Carolina.

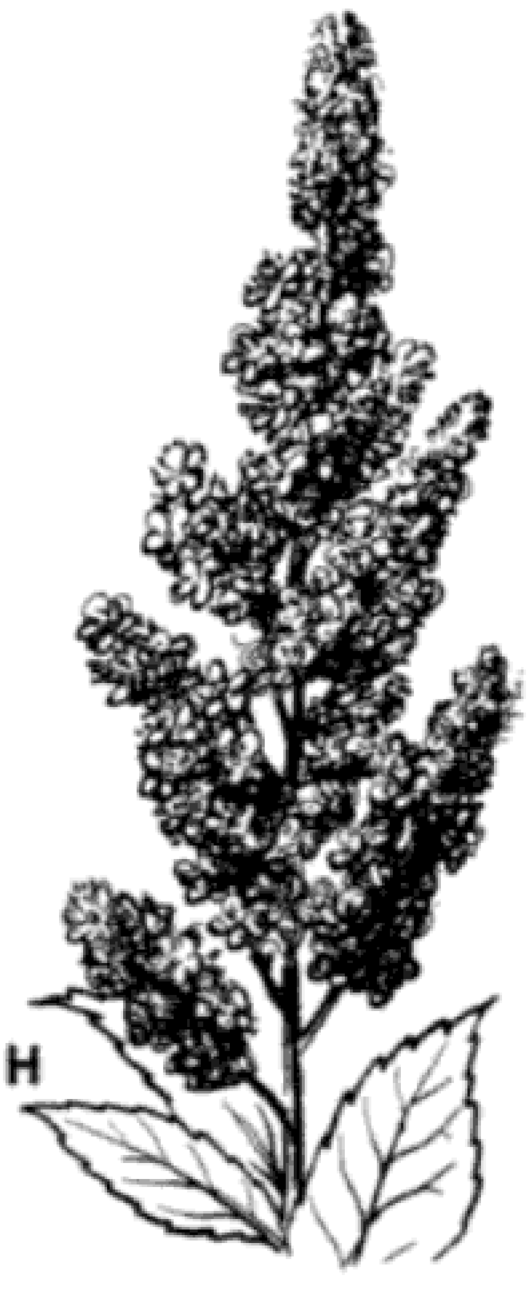
V DWARF SPIREA, *Spiraea corymbosa* p. 273
Mountains; n. New Jersey and Pennsylvania to Kentucky and Georgia.

V VIRGINIA SPIREA, *Spiraea virginiana* p. 273
Damp rocky slopes; W. Virginia, w. N. Carolina, and Tennessee.

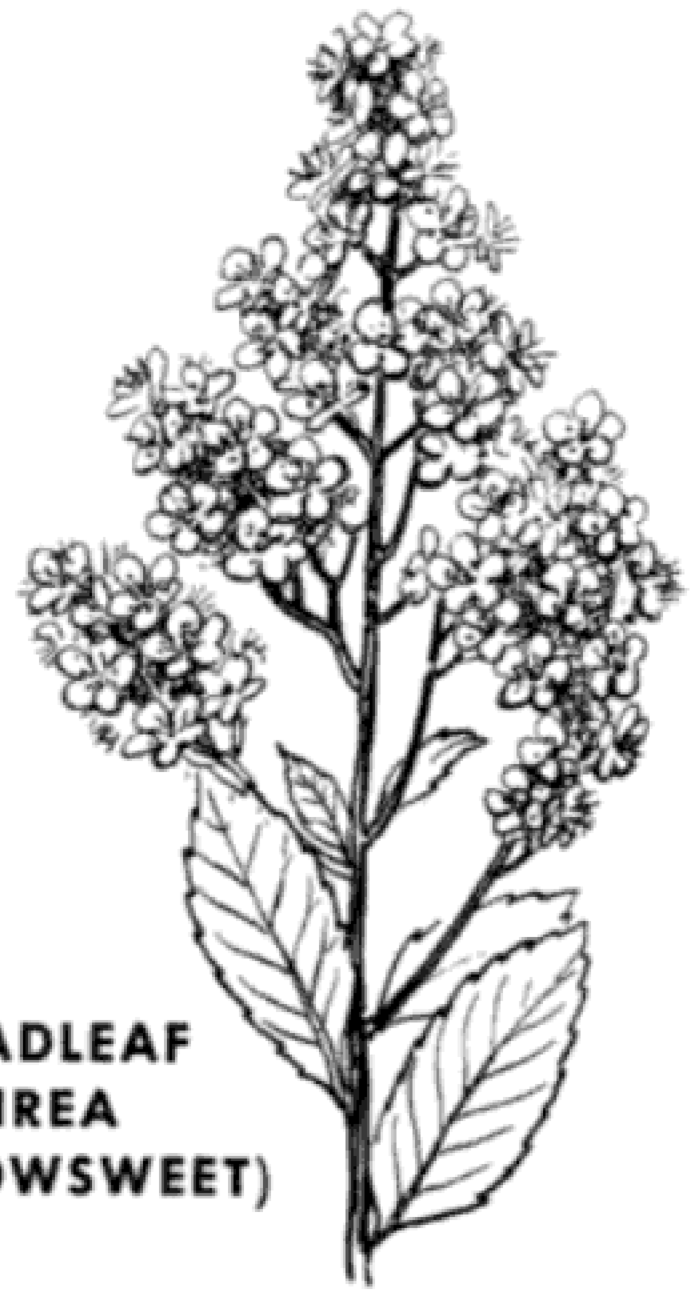
  V JAPANESE SPIREA, S. *japonica* (not illus.) p. 273



Typical spirea fruit



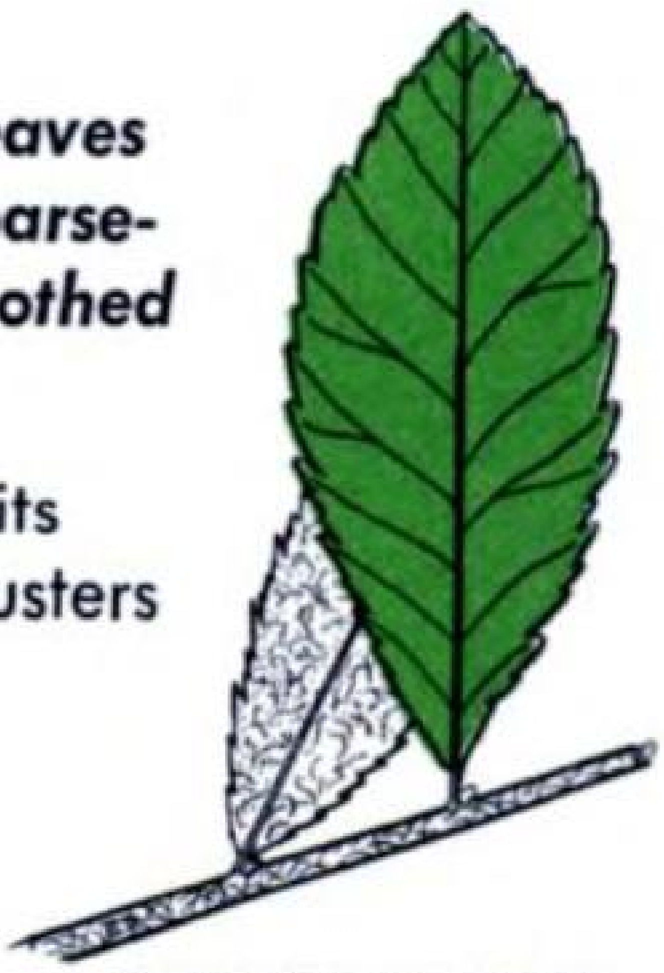
STEEPLEBUSH

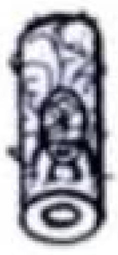


BROADLEAF SPIREA (MEADOWSWEET)

Leaves coarse-toothed

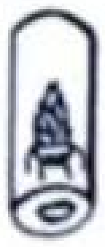
Flowers and fruits in long, erect clusters

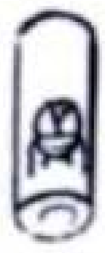




Only spirea with twigs and undersides of leaves woolly

STEEPLEBUSH

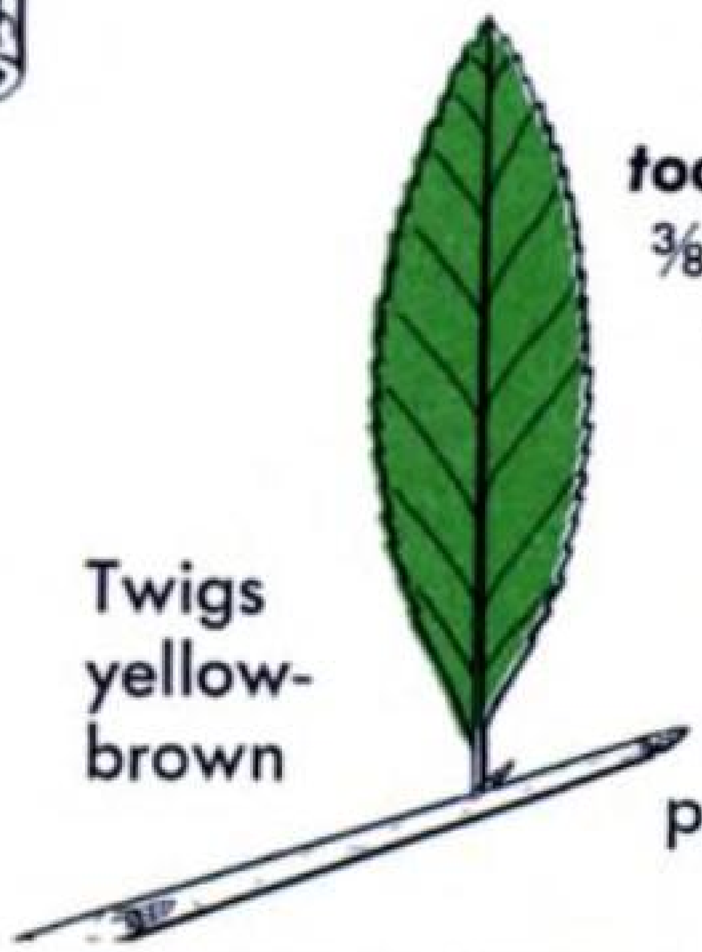




Leaves

fine-toothed ⅜"–¾" wide

coarse-toothed ⅝"–1⅛" wide



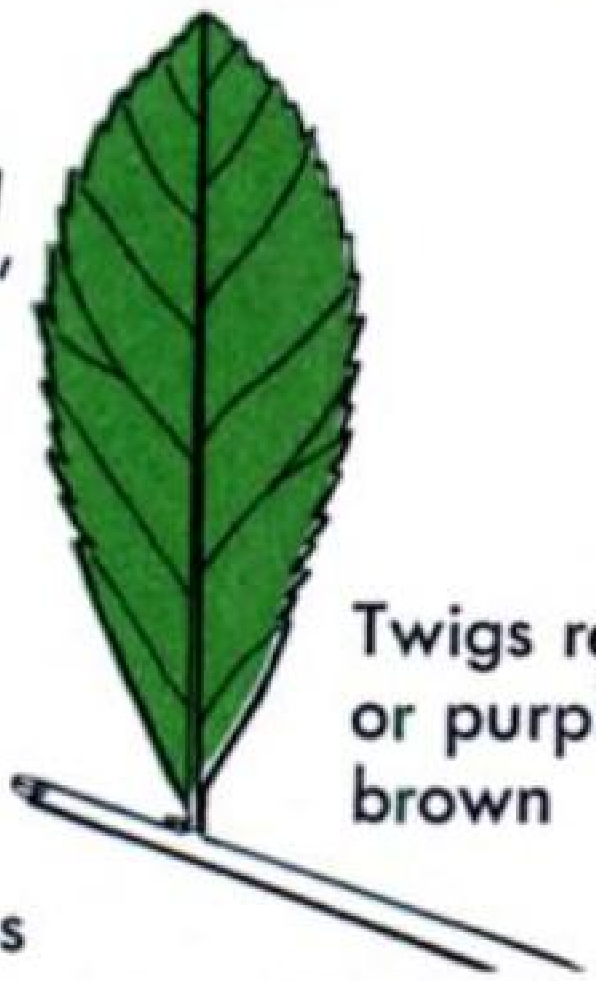
Twigs yellow-brown

Flowers and fruits in long, erect clusters

Buds

pointed, silky

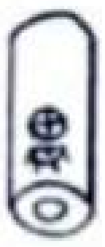
short, hairless

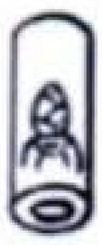


Twigs red or purplish brown

NARROWLEAF

BROADLEAF

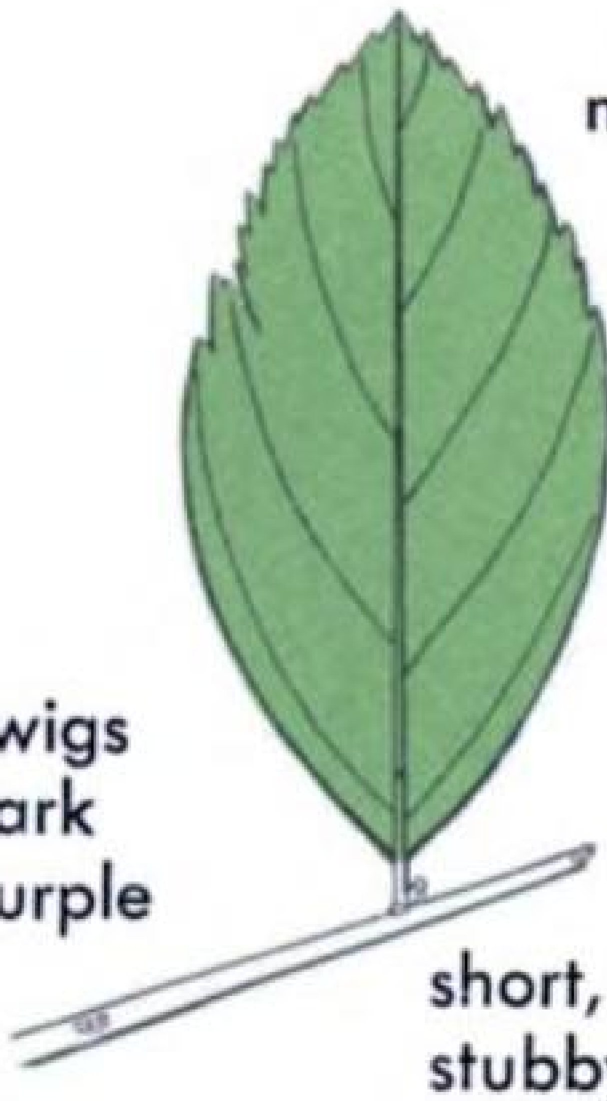




Leaves coarse-toothed

above middle; 1"–2" wide

or not toothed; ¼"–¾" wide



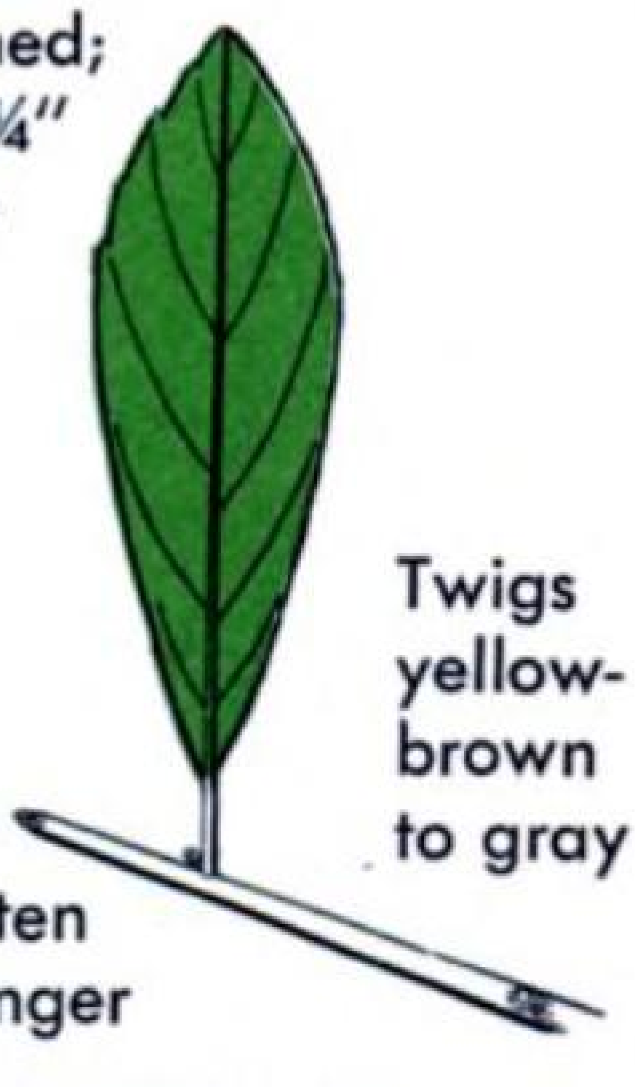
Twigs dark purple

Flowers, fruits in flat-topped clusters

Buds hairless

short, stubby

often longer



Twigs yellow-brown to gray

DWARF

VIRGINIA

HOLLIES

Trees and shrubs mostly with toothed or thorny leaves. Very tiny, black, sharp stipules on either side of most leaf scars (use lens.).

♠ AMERICAN HOLLY, *Ilex opaca* p. 274
Moist woods; e. Massachusetts, se. New York, e. Pennsylvania, s. Ohio, se. Missouri, and Oklahoma to Florida and Texas.

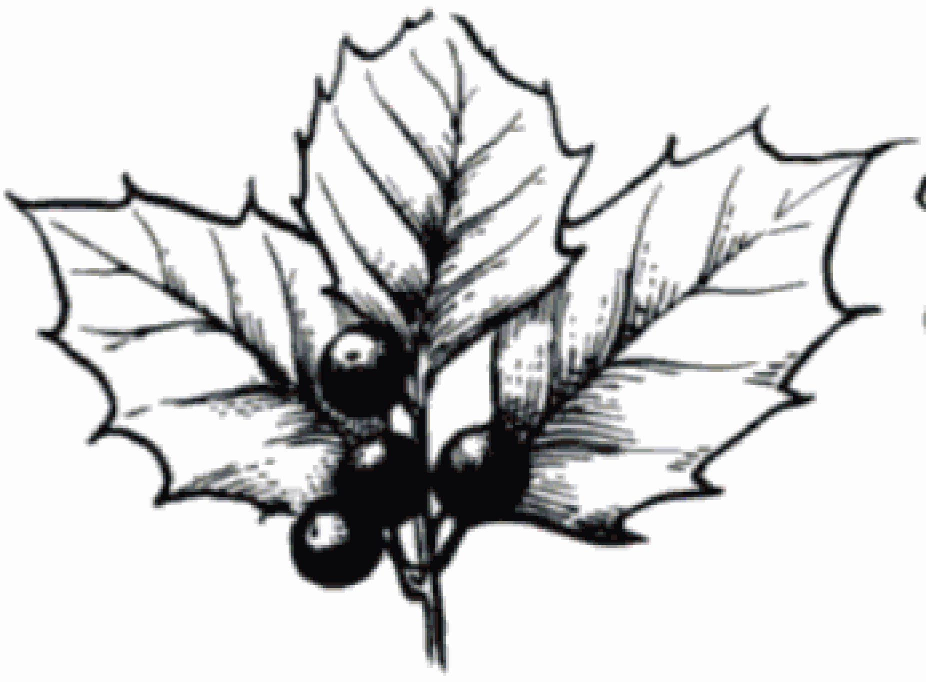
V LOW GALLBERRY HOLLY, *Ilex glabra* p. 274
Sandy and peaty soils; Nova Scotia to Florida and Louisiana.
V TALL GALLBERRY HOLLY p. 275
I. coriacea (leaf illus.)
♠V YAUPON HOLLY, *I. vomitoria* (leaf illus.) p. 275

♠V DECIDUOUS HOLLY, *Ilex decidua* p. 275
Woods and thickets; Coastal Plain and Piedmont Plateau, Maryland to Florida, west to s. Texas, and north in Mississippi Valley to sw. Indiana, s. Illinois, Missouri, se. Kansas, and e. Oklahoma.
V JUNEBERRY HOLLY, *I. amelanchier* (not illus.) p. 275

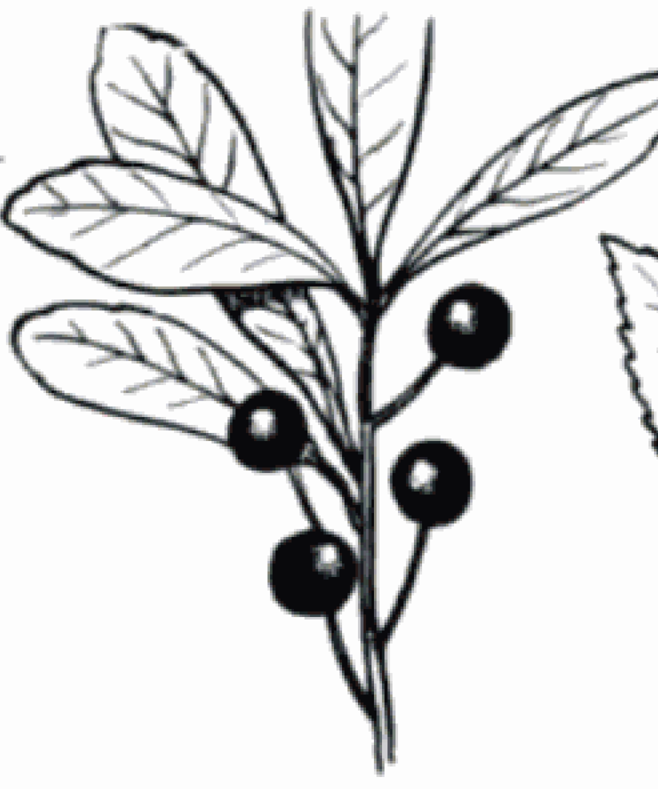
♠V LARGELEAF HOLLY, *Ilex montana* p. 276
Wet slopes and bottomlands; sw. Massachusetts and w. New York to nw. Florida and Louisiana.
V GEORGIA HOLLY, *I. longipes* (not illus.) p. 276

V COMMON WINTERBERRY HOLLY p. 276
Ilex verticillata
Wet thickets and swamps; Newfoundland and Minnesota to Georgia, Tennessee, and Missouri.

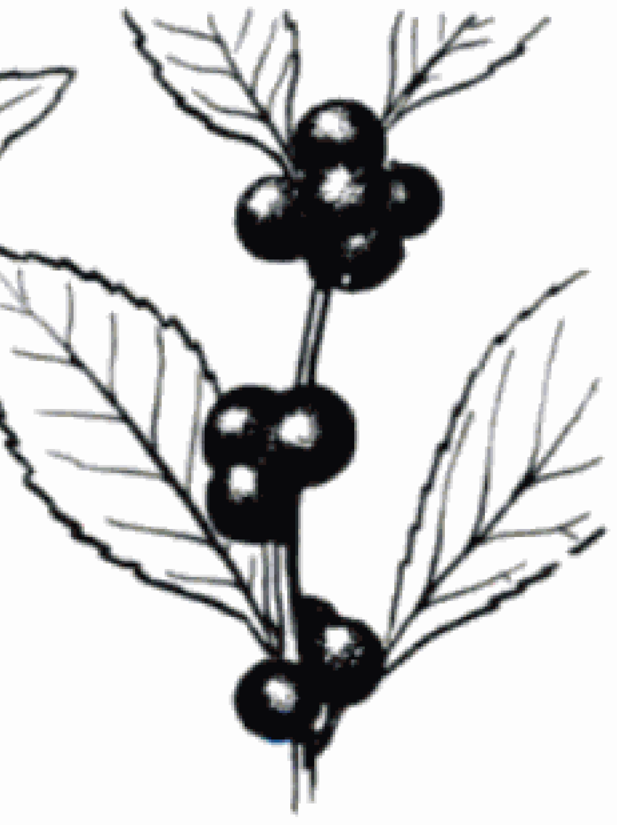
♠V SMOOTH WINTERBERRY HOLLY, *Ilex laevigata* p. 276
Lowland thickets and swamps; mostly Coastal Plain, s. Maine. and New York to n. Georgia.



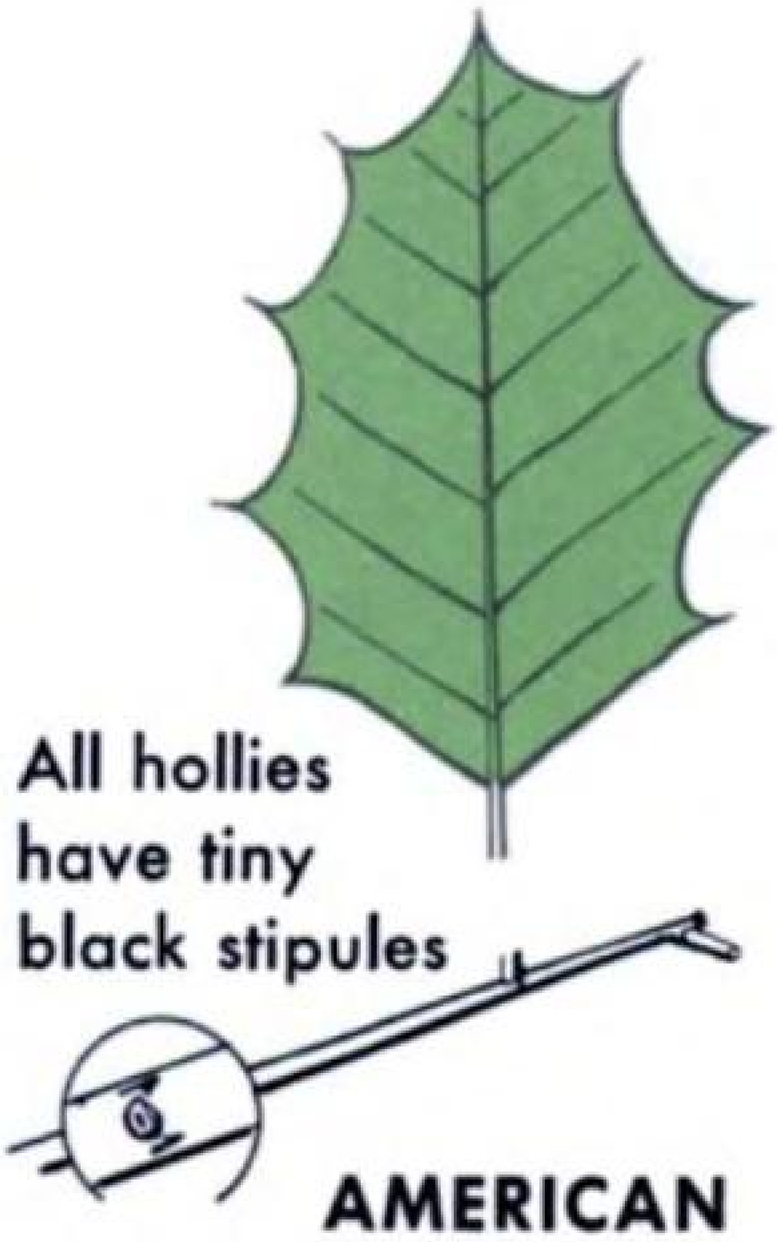
AMERICAN



LOW GALLBERRY



COMMON WINTERBERRY


All hollies
have tiny
black stipules

AMERICAN

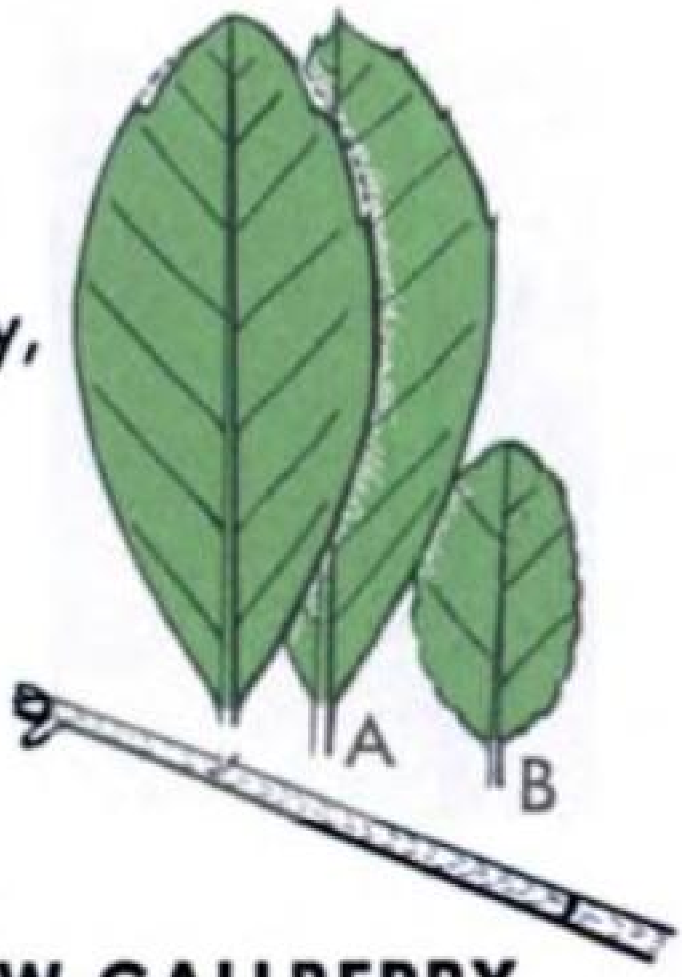
Leaves leathery,
evergreen

thorny,
rarely

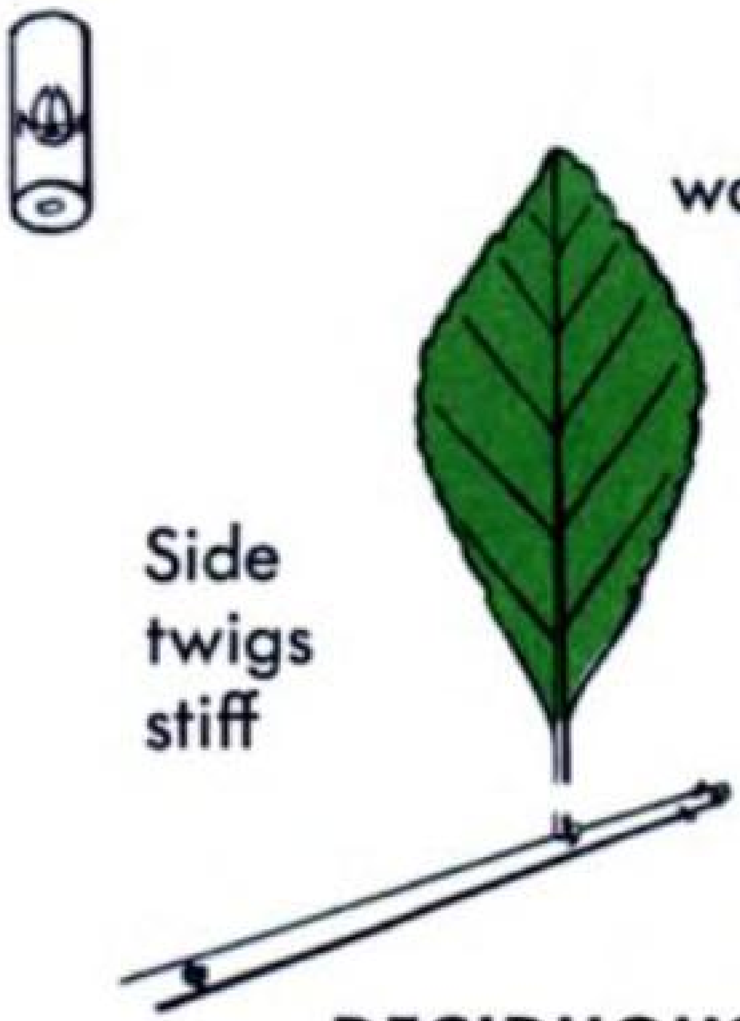
not
thorny,
often

without teeth

A—TALL GALLBERRY
B—YAUPON



LOW GALLBERRY


Side
twigs
stiff

DECIDUOUS

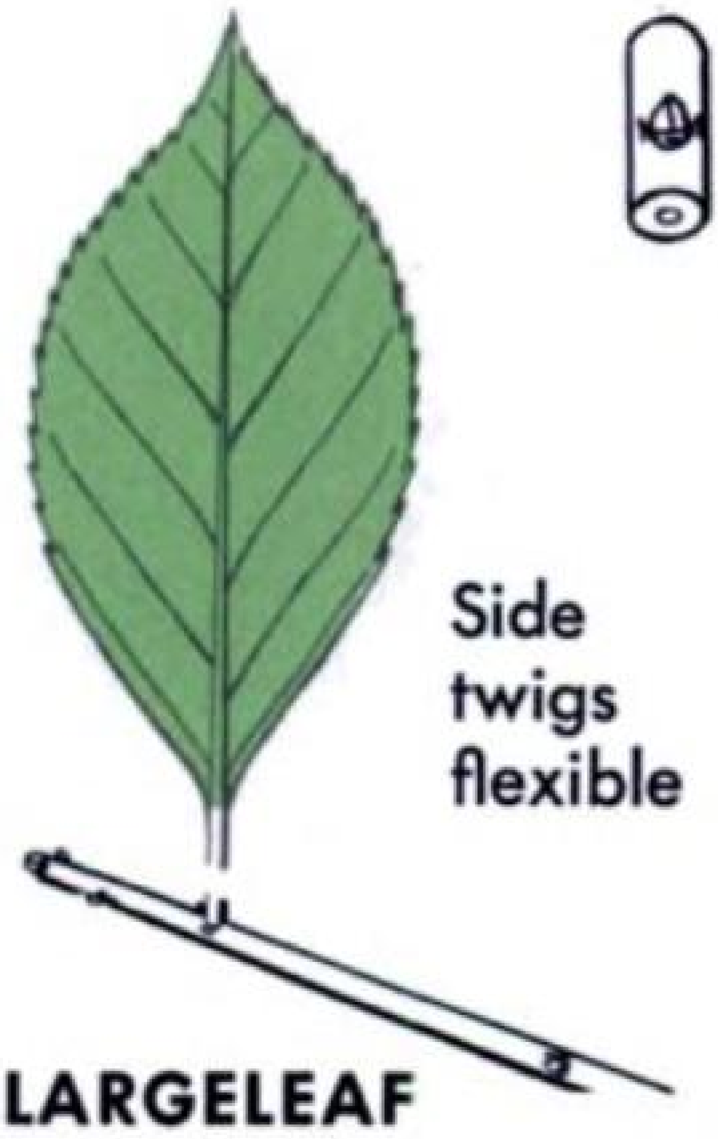
Leaves thin,
not evergreen

wavy-edged
or bluntly
toothed

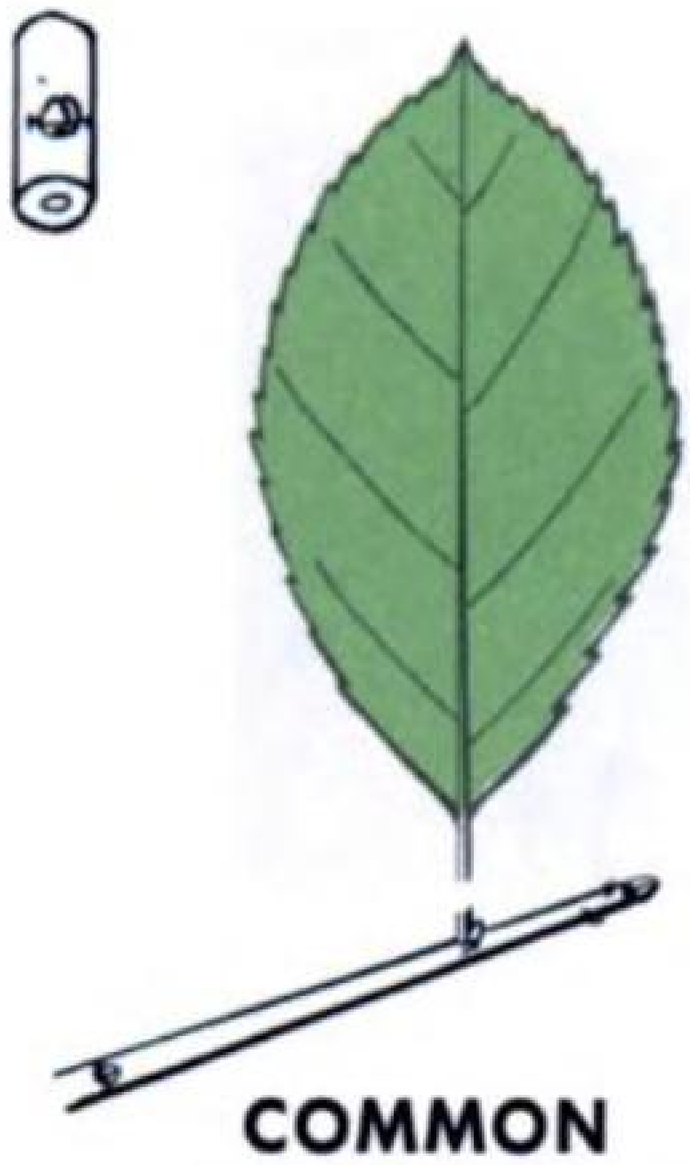
finely,
sharply
toothed

Seeds ridged on
curved surfaces

Buds pointed


Side
twigs
flexible

LARGELEAF



COMMON
WINTERBERRY

Leaves thin,
not evergreen

dull,
coarse-
toothed

shiny,
finer-
toothed

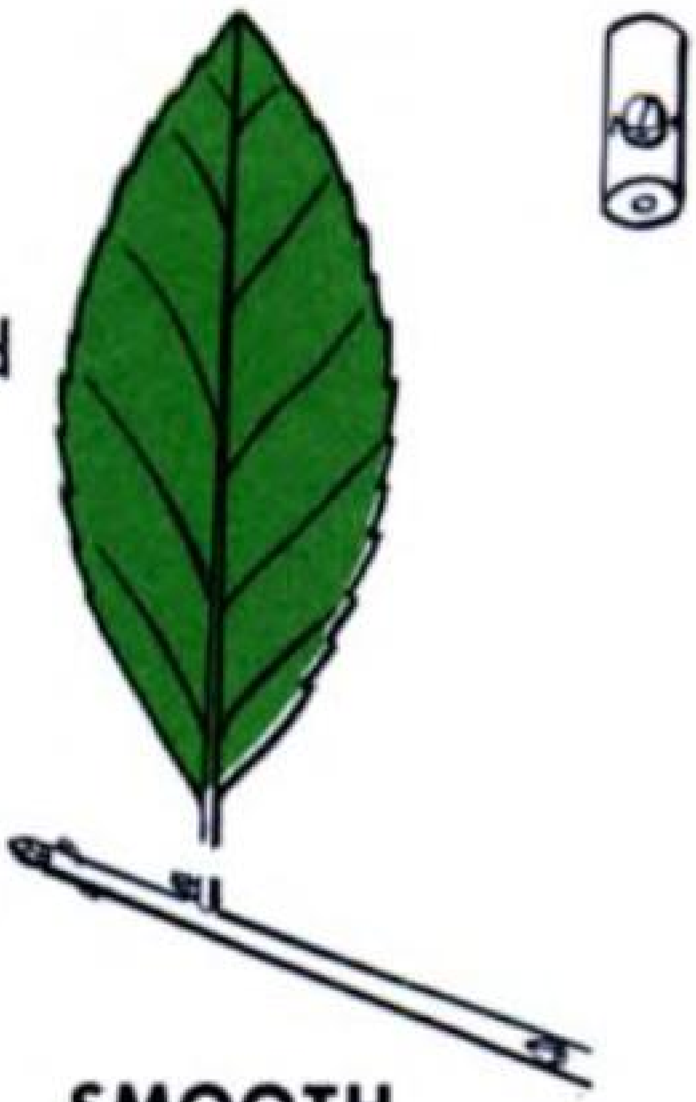
Seeds smooth

Side twigs flexible

Buds blunt,

scales
broadly
pointed

scales
sharply
pointed



SMOOTH
WINTERBERRY

BLUEBERRIES

Shrubs with small leaves and green or reddish twigs covered with tiny "warts" (obscured if twigs hairy).

V VELVETLEAF BLUEBERRY, *Vaccinium myrtilloides* p. 277
Woods and swamps; Newfoundland, Quebec, and British Columbia to Nova Scotia, w. New England, Pennsylvania, w. Virginia, n. Ohio, n. Illinois, ne. Iowa, and Montana.

V BLACK HIGHBUSH BLUEBERRY p. 277
Vaccinium atrococcum
Wet or barren sites; New England, New York, and s. Ontario to n. Florida and Arkansas.

V COASTAL HIGHBUSH BLUEBERRY p. 278
V. caesariense (not illus.)

V COMMON HIGHBUSH BLUEBERRY p. 278
Vaccinium corymbosum
Acid soils; Nova Scotia, s. Quebec, and Wisconsin to Florida and Louisiana.

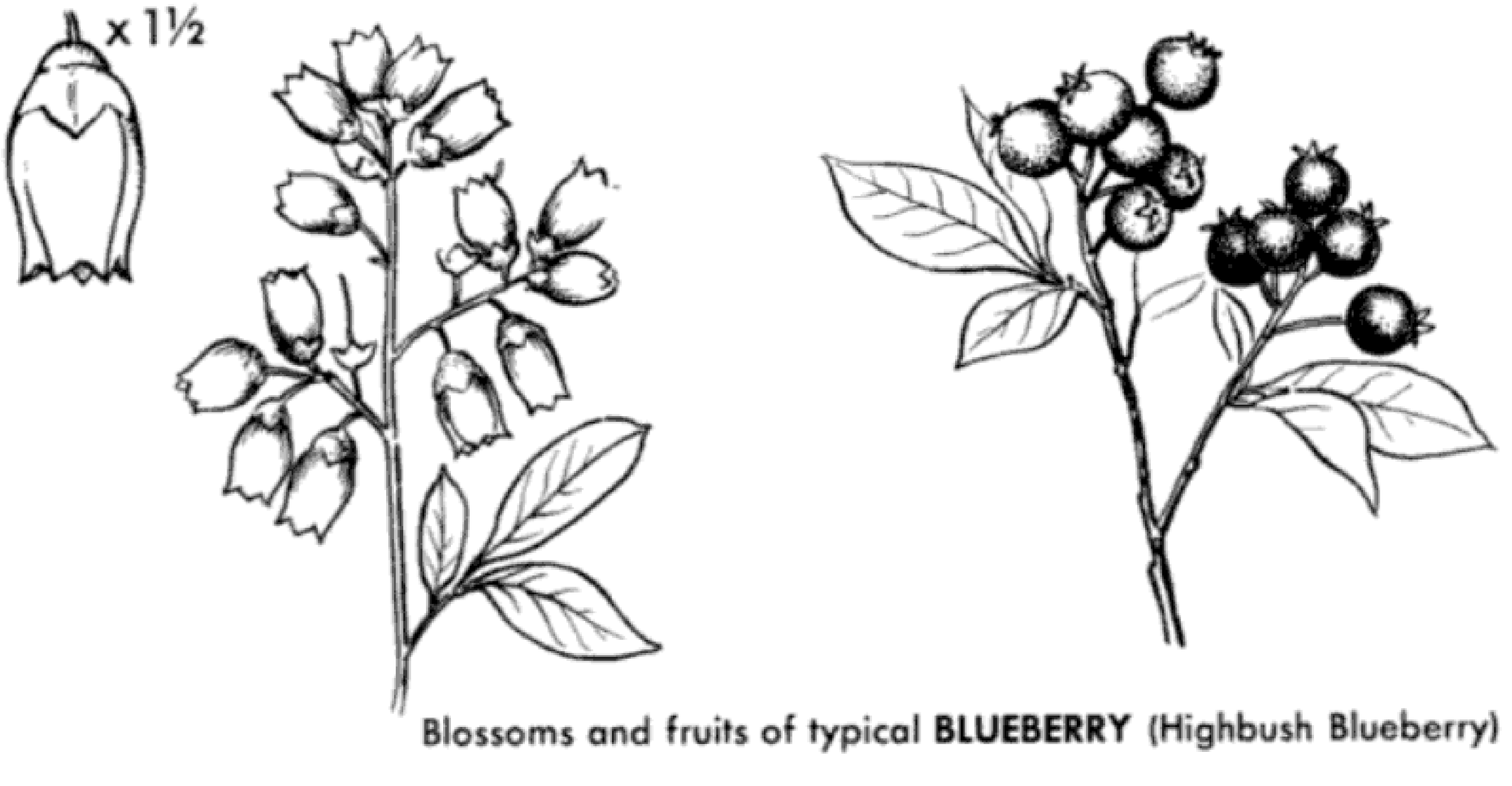
V ELLIOTT BLUEBERRY, *V. elliottii* (not illus.) p. 278

V EARLY LOW BLUEBERRY, *Vaccinium vacillans* p. 278
Dry woods and thickets; w. Nova Scotia, s. Ontario, Michigan, ne. Iowa, and e. Kansas to Georgia and Missouri.

V SLENDER BLUEBERRY, *V. tenellum* (not illus.) p. 279

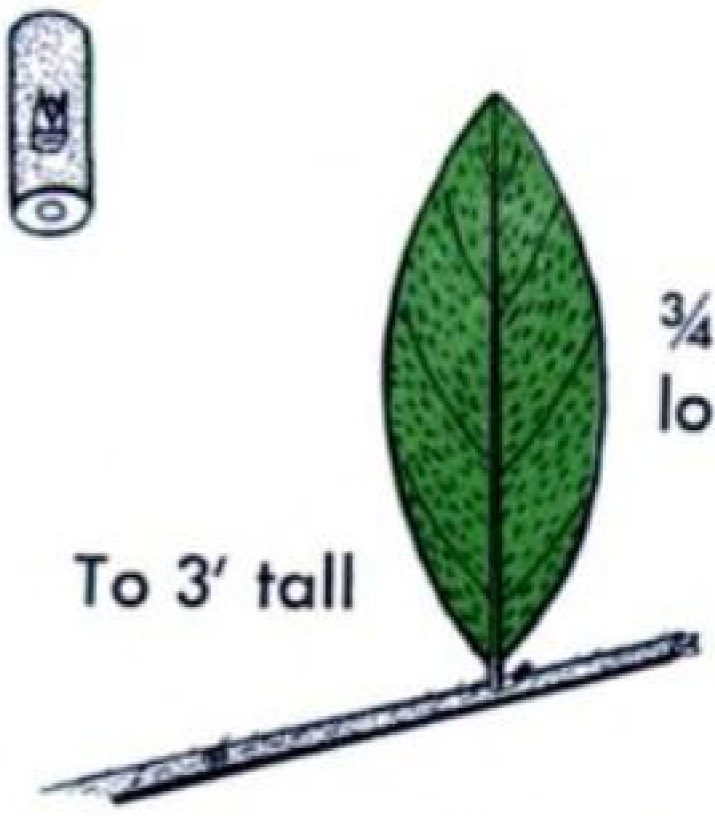
V LATE LOW BLUEBERRY, *Vaccinium angustifolium* p. 279
Tundras, bogs, and barrens; Newfoundland, Labrador, n. Ontario, and Minnesota to Delaware, Maryland, w. Virginia, W. Virginia, Ohio, and ne. Iowa.

V SOUTHERN LOW BLUEBERRY p. 279
Vaccinium pallidum
Dry woods; se. Virginia, W. Virginia, and Missouri to Georgia, Alabama, and Arkansas.



Blossoms and fruits of typical **BLUEBERRY** (Highbush Blueberry)

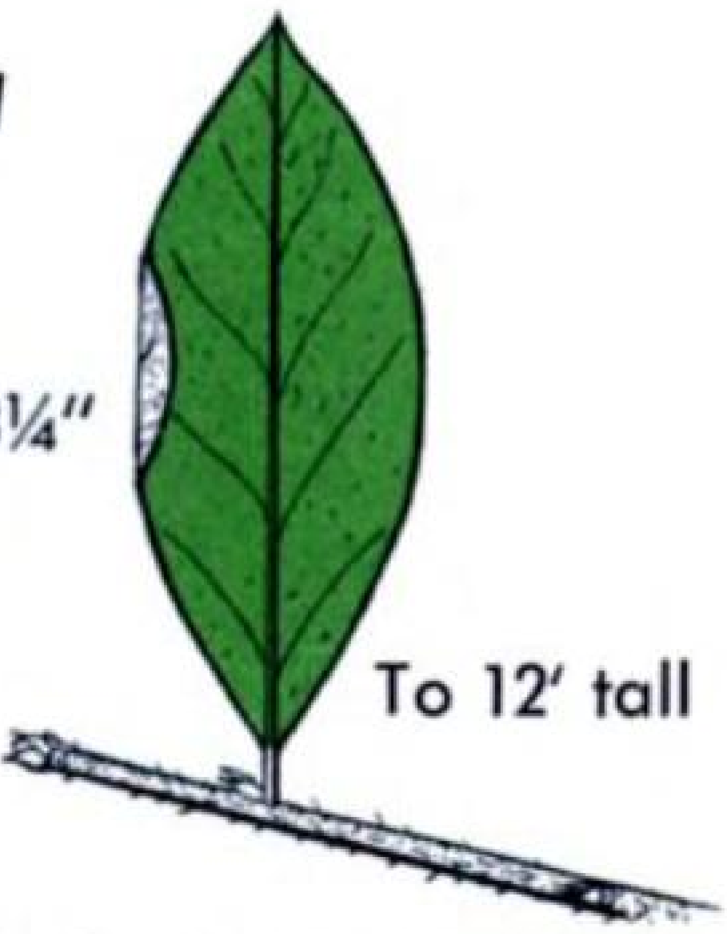
Leaves never toothed
velvety to woolly beneath



¾"–1⅝"
long

To 3′ tall

VELVETLEAF



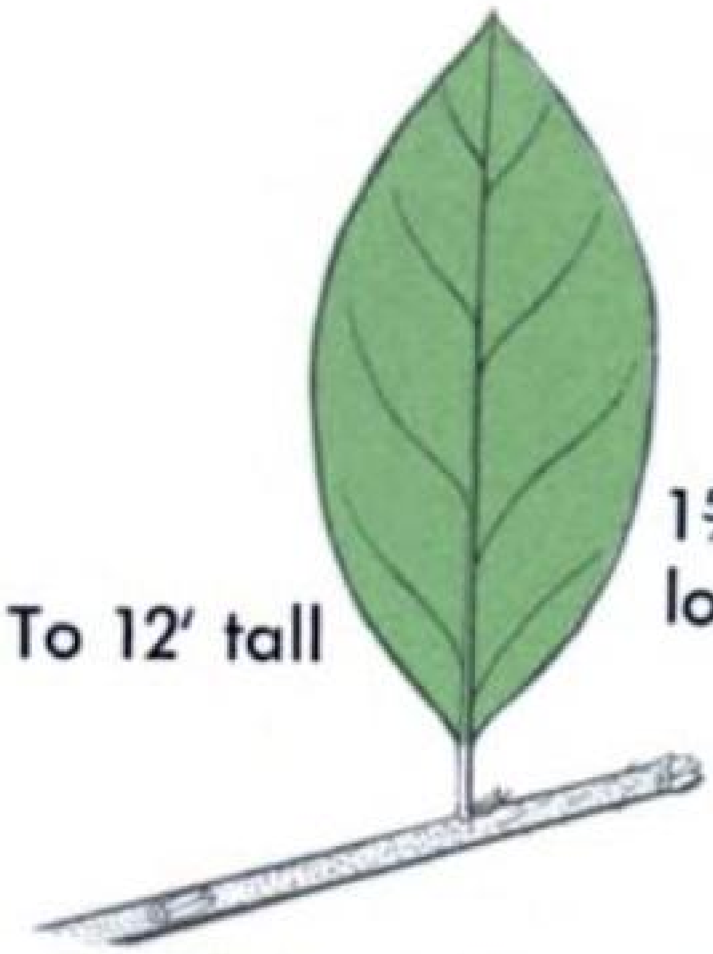
1⅝"–3¼"
long

To 12′ tall

BLACK HIGHBUSH

Twigs hairy

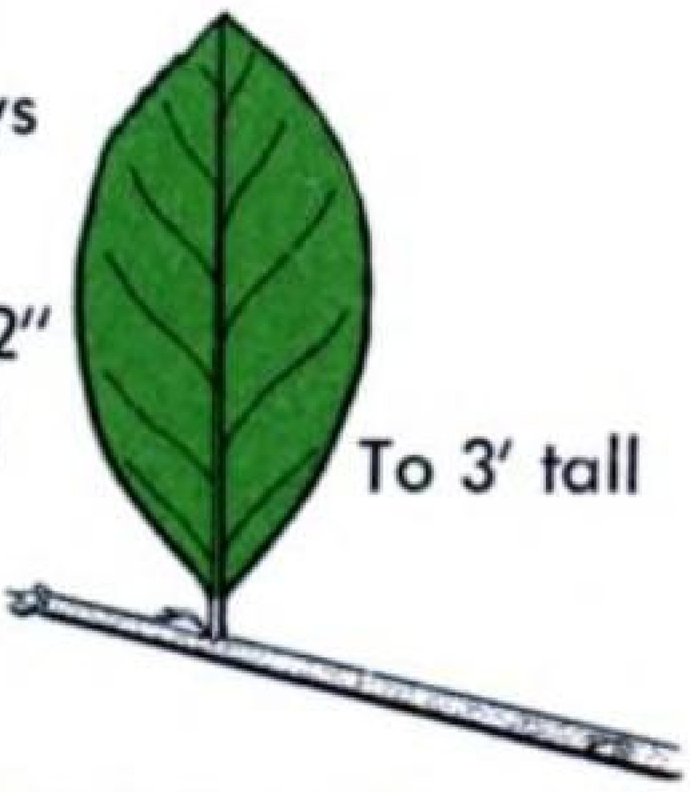
Leaves toothed or not
hairless or nearly so
sometimes always
whitened beneath



1⅝"–3¼"
long

To 12′ tall

COMMON HIGHBUSH



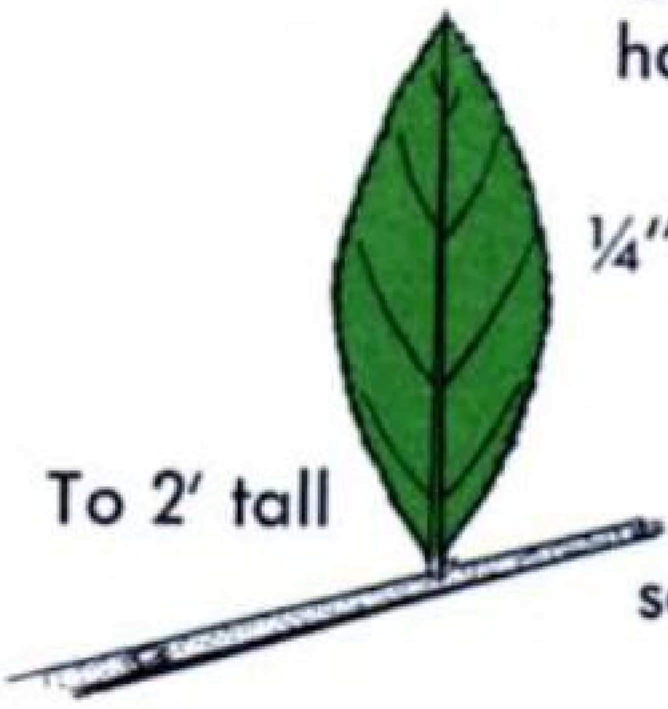
⅝"–2"
long

To 3′ tall

EARLY LOW

Twigs hairy or hairless

Leaves always toothed
sometimes never
hairy or whitened beneath

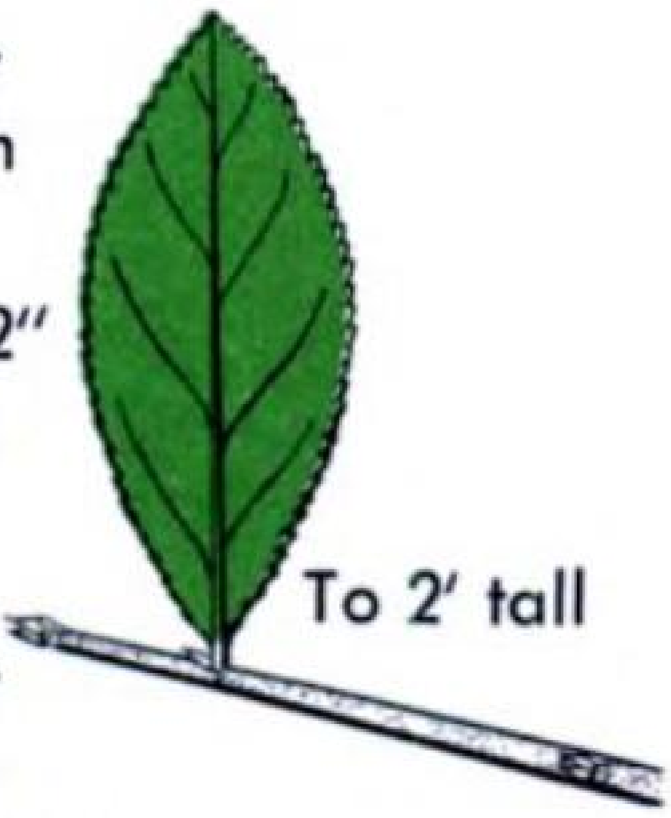


¼"–1⅜"
long

To 2′ tall

Twigs
sometimes
hairy

LATE LOW



1¼–2"
long

To 2′ tall

never
hairy

SOUTHERN LOW

HUCKLEBERRIES, BILBERRIES, ETC.

Shrubs mostly with small leaves. Twigs not covered with fine "warts."

ψ DWARF HUCKLEBERRY, *Gaylussacia dumosa* p. 280
Sandy soils and bogs, mostly near coast; Newfoundland, e. New Brunswick, e. Pennsylvania, and Tennessee to Florida and Mississippi.

ψ TALL HUCKLEBERRY, *G. frondosa* (not illus.) p. 280

ψ BLACK HUCKLEBERRY, *Gaylussacia baccata* p. 280
Woods and swamps; Newfoundland and Saskatchewan to Georgia and Louisiana.

ψ TALL DEERBERRY, *Vaccinium stamineum* p. 280
Woods and openings; Massachusetts, s. Ontario, Indiana, Missouri, and Kansas to Florida and Louisiana.

ψ LOW DEERBERRY, *V. caesium* (not illus.) p. 281

ψ TUNDRA BILBERRY, *Vaccinium uliginosum* p. 281
Tundras, bogs, and stony ground; Arctic to Newfoundland, n. New England, n. New York, n. Michigan, and n. Minnesota.

ψ OVALLEAF BILBERRY, *V. ovalifolium* (not illus.) p. 281

ψ SQUARE-TWIG BILBERRY p. 281
Vaccinium membranaceum
Thickets; w. Ontario and n. Michigan; sw. S. Dakota; also s. British Columbia to California.

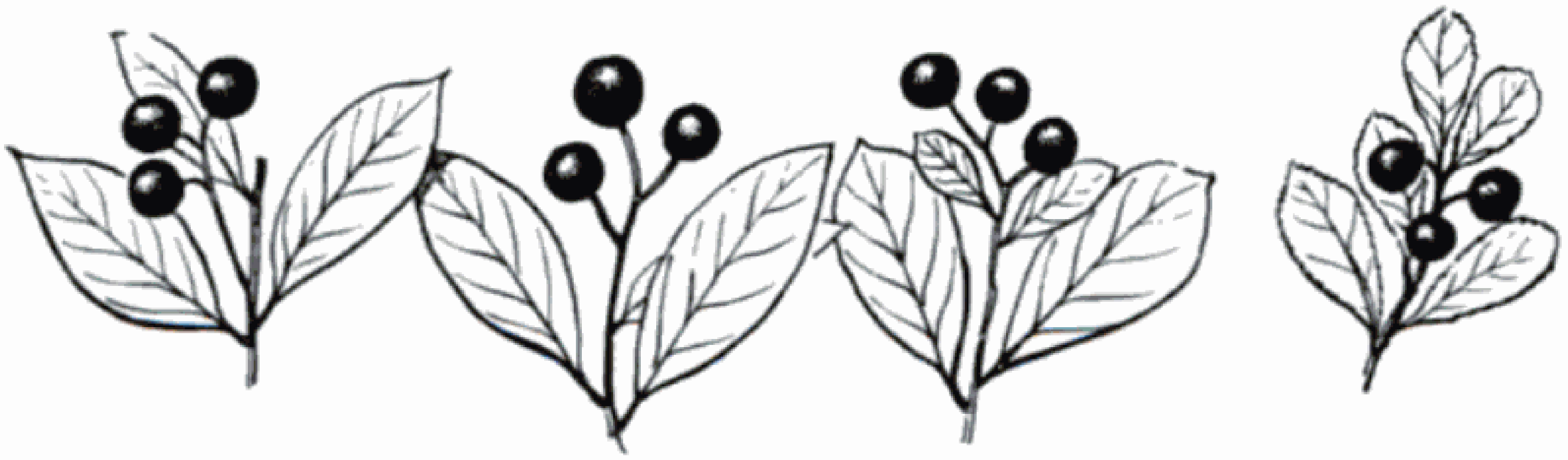
ψ NEWFOUNDLAND BILBERRY p. 282
V. nubigenum (not illus.)

ψ DWARF BILBERRY, *Vaccinium cespitosum* p. 282
Poor soils; Newfoundland, Labrador, and Alaska to n. New England, n. New York, n. Michigan, n. Minnesota, Colorado, and California.

ψ SOUTHERN MOUNTAIN-CRANBERRY p. 282
V. erythrocarpum (not illus.)

ψ BOX HUCKLEBERRY, *Gaylussacia brachycera* p. 282
Dry woods; local, Delaware, and W. Virginia to Tennessee.

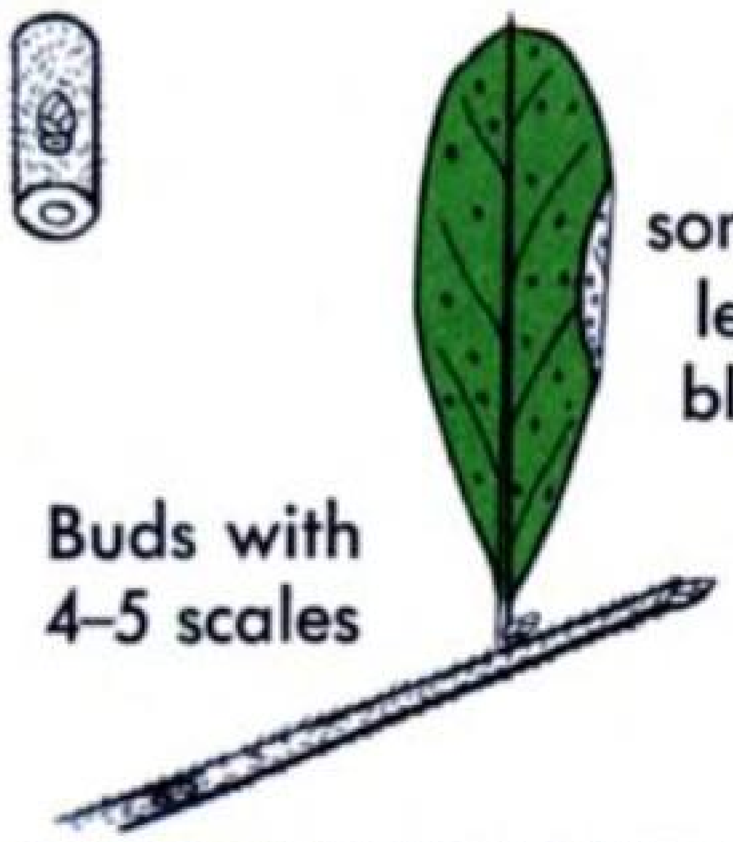
↑ψ FARKLEBERRY, *Vaccinium arboreum* p. 282
Dry Coastal Plain woods; se. Virginia to Florida, west to centr. Texas, and north in Mississippi Valley to s. Indiana, s. Illinois, Missouri, and se. Kansas.



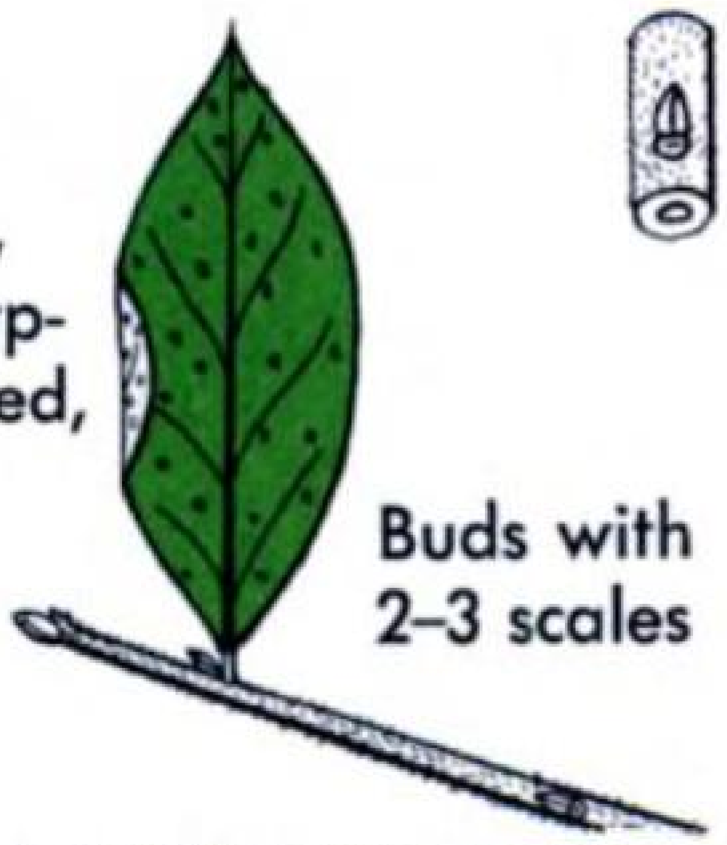
Leaves not toothed
with yellow resin-dots,

somewhat leathery; blunt tip, shiny | thin, sharp-tipped, dull

Twigs hairy


Buds with
4–5 scales

DWARF HUCKLEBERRY

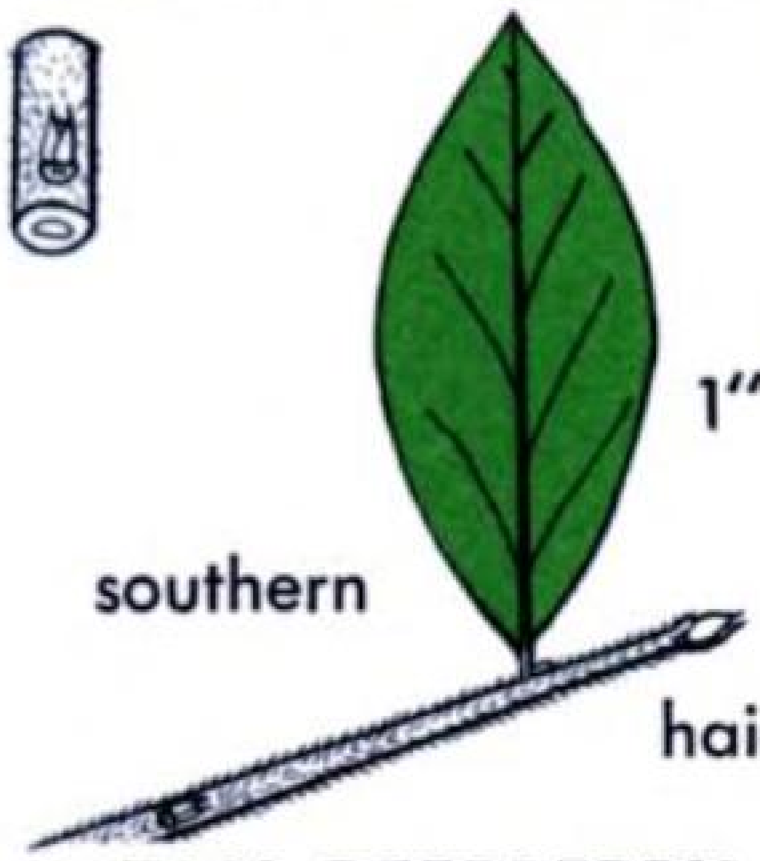

Buds with
2–3 scales

BLACK HUCKLEBERRY

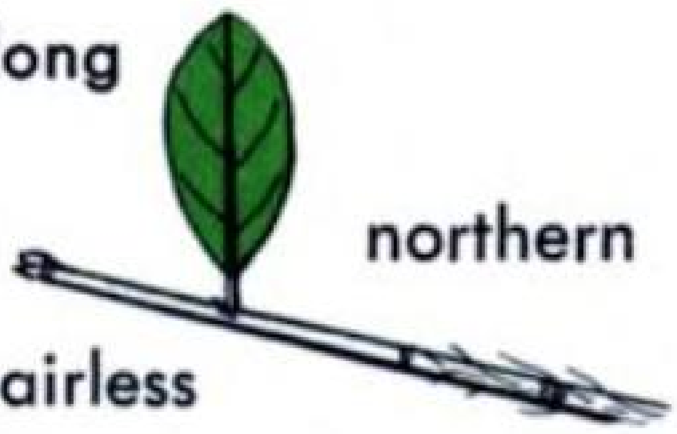
Leaves not toothed
without resin-dots

over 1″ long | to 1″ long

Twigs hairy | hairless



TALL DEERBERRY

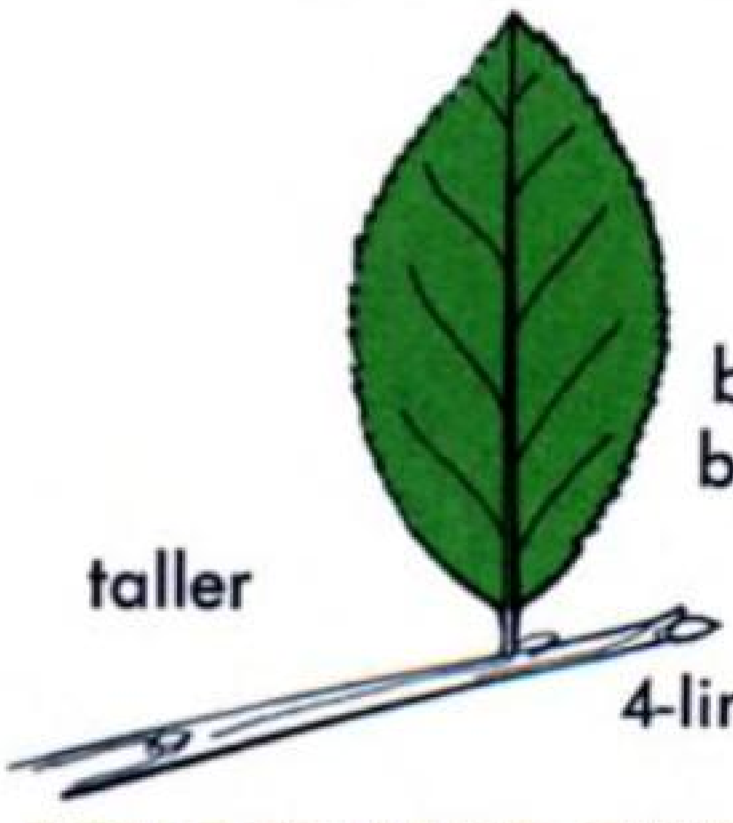


TUNDRA BILBERRY

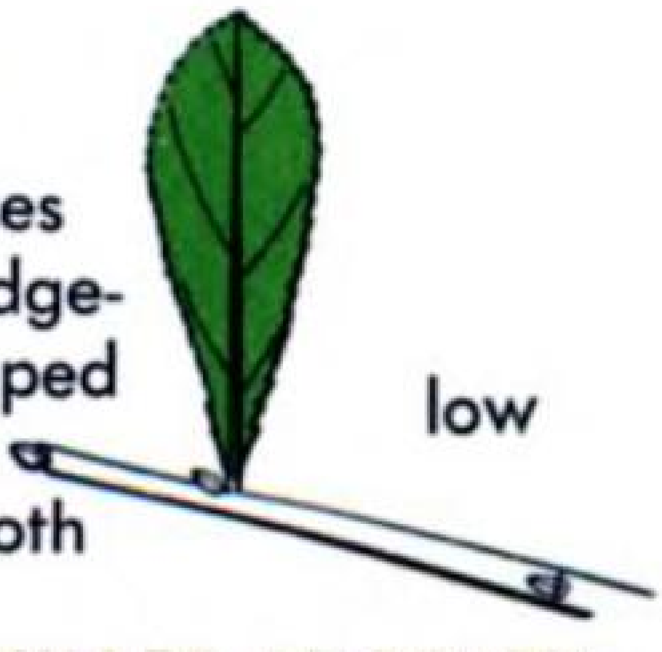
Leaves toothed
thin
without resin-dots

bases broad | bases wedge-shaped

Twigs 4-lined | smooth



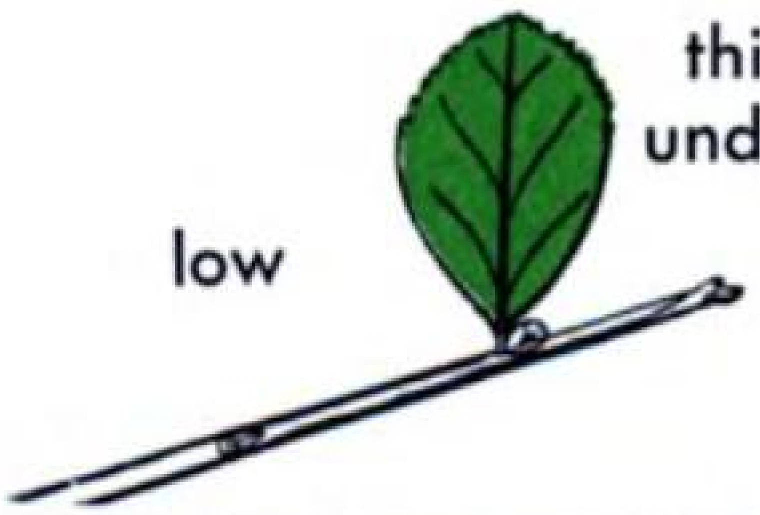
SQUARE-TWIG BILBERRY



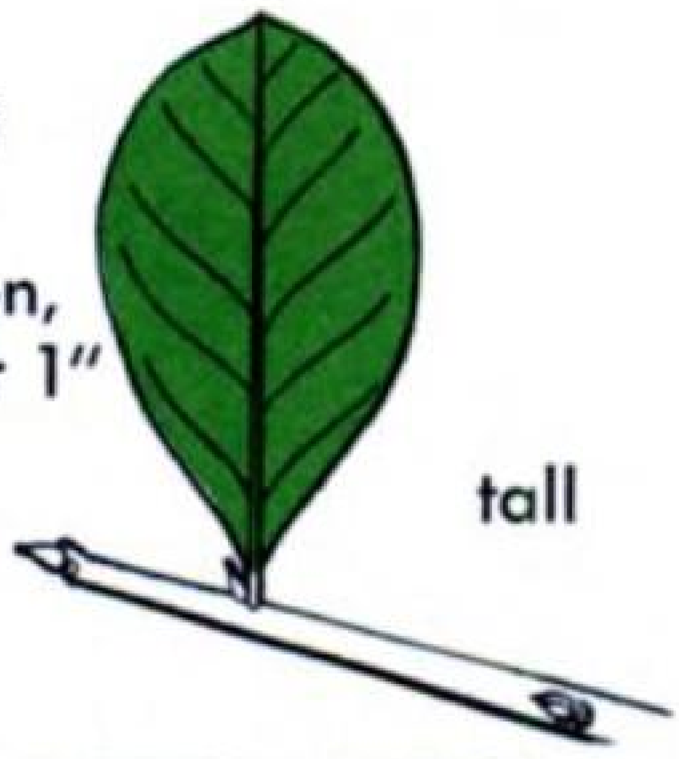
DWARF BILBERRY

Leaves toothed or not
without resin-dots,
thick, leathery, evergreen,

under 1″ | over 1″



BOX HUCKLEBERRY



FARKLEBERRY

AZALEAS

Leaves and buds clustered near the twig tips, and often with several twigs originating from an old end-bud cluster. Leaves with hairy edges (use lens); end buds often large; fruits long capsules.

ψ SMOOTH AZALEA, *Rhododendron arborescens* p. 283
Rich soils; Pennsylvania and Kentucky to Georgia and Alabama.
  ψ PINKSHELL AZALEA, *R. vaseyi* (not illus.) p. 283

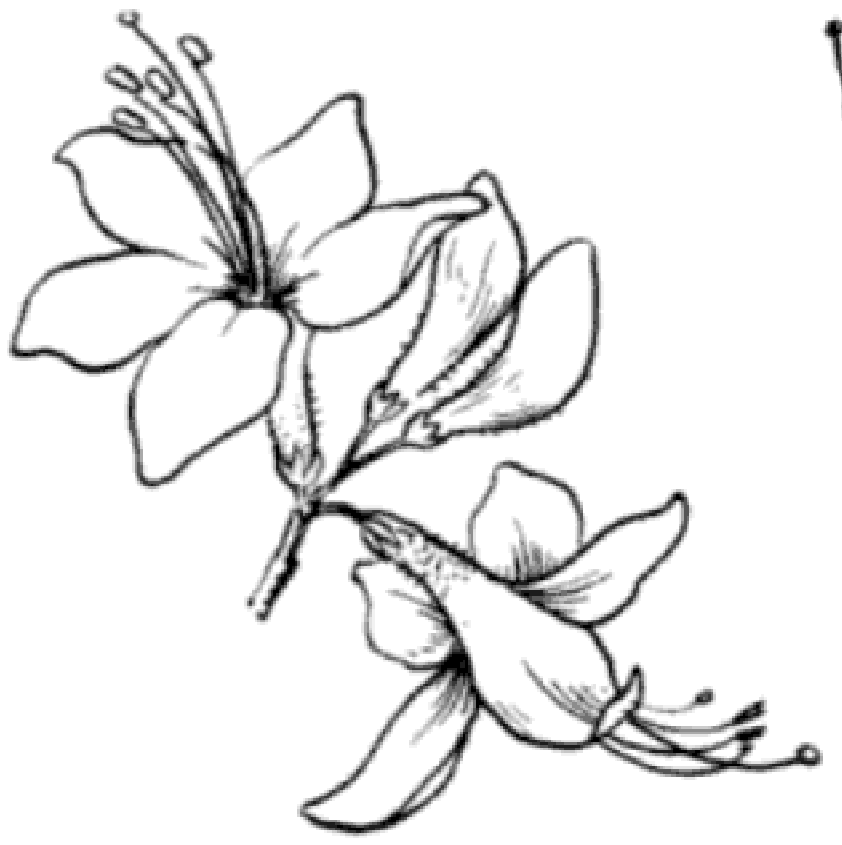
ψ RHODORA AZALEA, *Rhododendron canadense* p. 284
Poor soils and acid bogs; Newfoundland and s.-centr. Quebec to n. New Jersey and ne. Pennsylvania.
  ψ JAPANESE AZALEA, *R. japonicum* (not illus.) p. 284

ψ EARLY AZALEA, *Rhododendron roseum* p. 284
Rocky slopes and woods; sw. Maine and sw. Quebec to the mts. of Virginia, Tennessee, and Missouri.
  ψ WOOLLY AZALEA, *R. canescens* (not illus.) p. 284

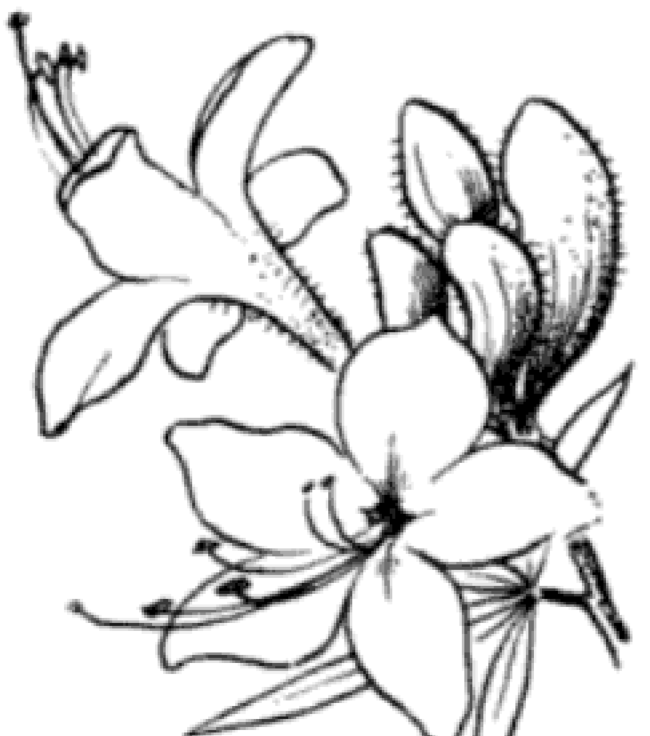
ψ FLAME AZALEA, *Rhododendron calendulaceum* p. 284
Wooded slopes; sw. Pennsylvania, se. Ohio, and W. Virginia to Georgia and Alabama.
  ψ CUMBERLAND AZALEA p. 285
  R. cumberlandense (not illus.)

ψ SWAMP AZALEA, *Rhododendron viscosum* p. 285
Wet thickets and woods; sw. Maine and ne. Ohio to S. Carolina and e. Tennessee.
  ψ TOOTHED AZALEA, *R. serrulatum* (not illus.) p. 285

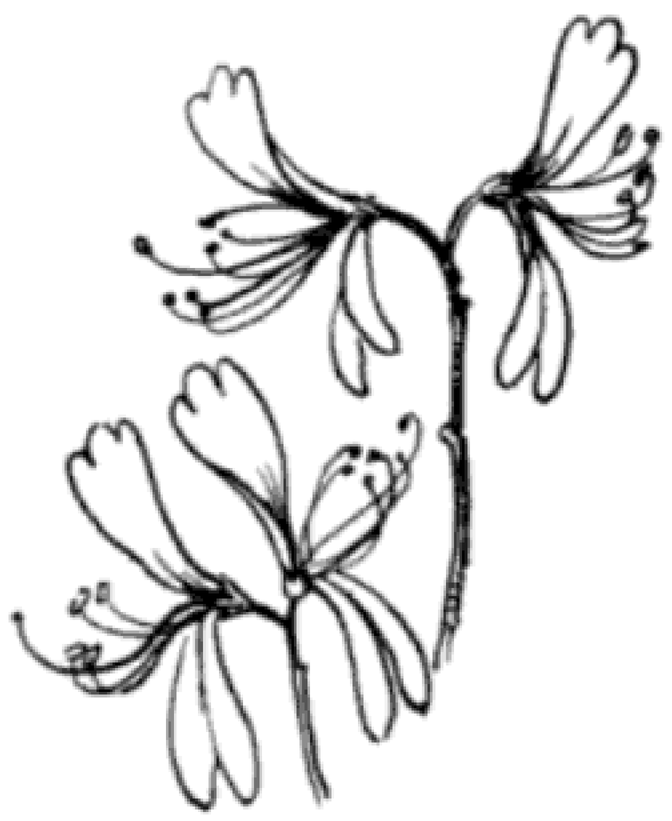
ψ PINK AZALEA, *Rhododendron nudiflorum* p. 285
Woods; Massachusetts and New York to s. S. Carolina, Tennessee, and s. Ohio.
  ψ DWARF AZALEA, *R. atlanticum* (not illus.) p. 285



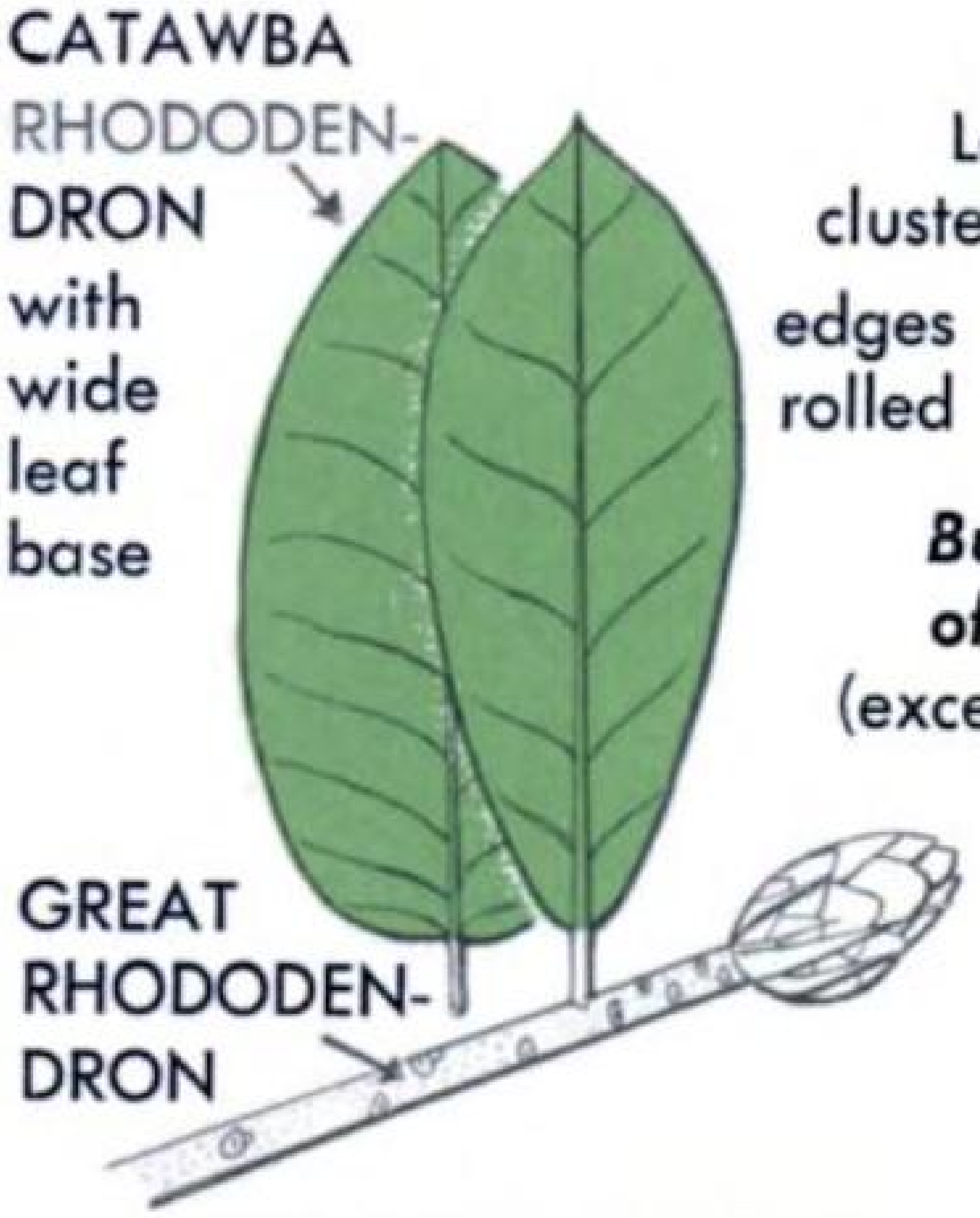
EARLY



FLAME



RHODORA


CATAWBA RHODODENDRON with wide leaf base
GREAT RHODODENDRON

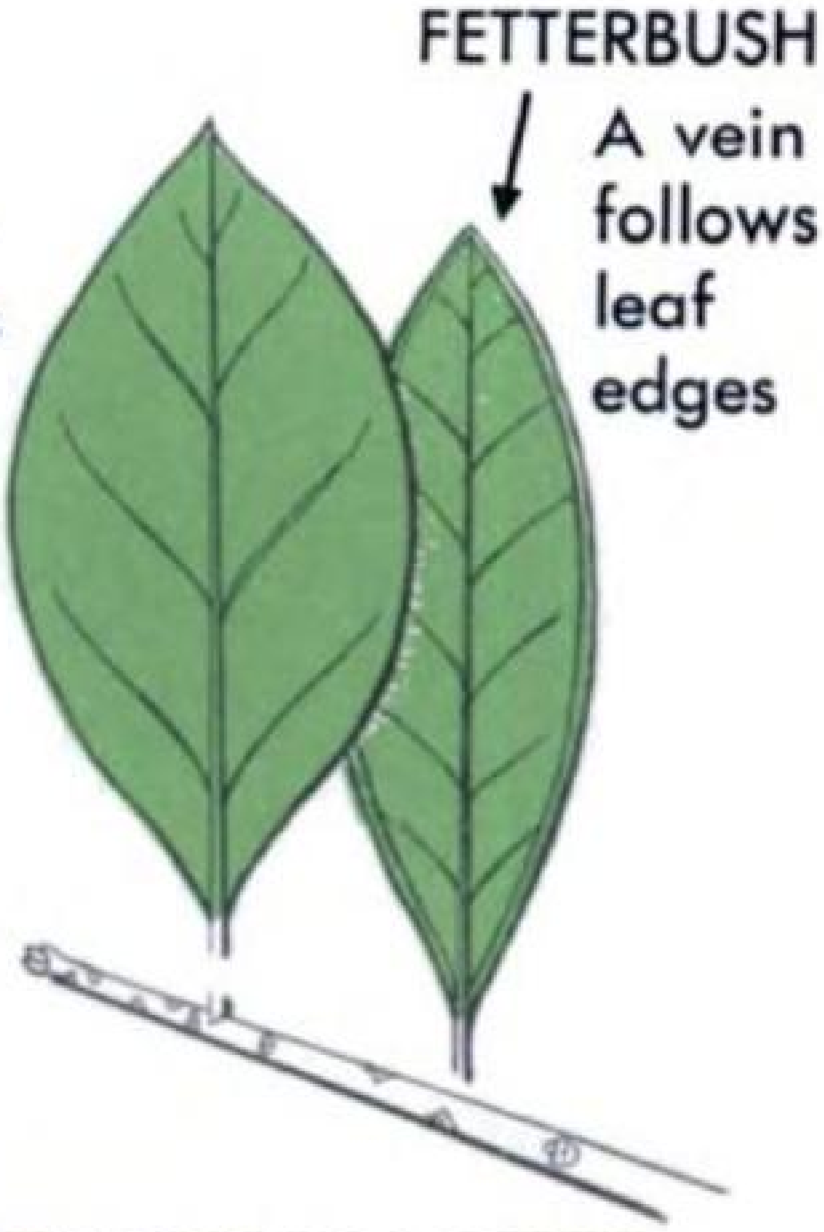
RHODODENDRONS

Leaves large,
clustered at twig tips,

edges rolled

edges flat

Bushy shrubs of rocky hills
(except Fetterbush)

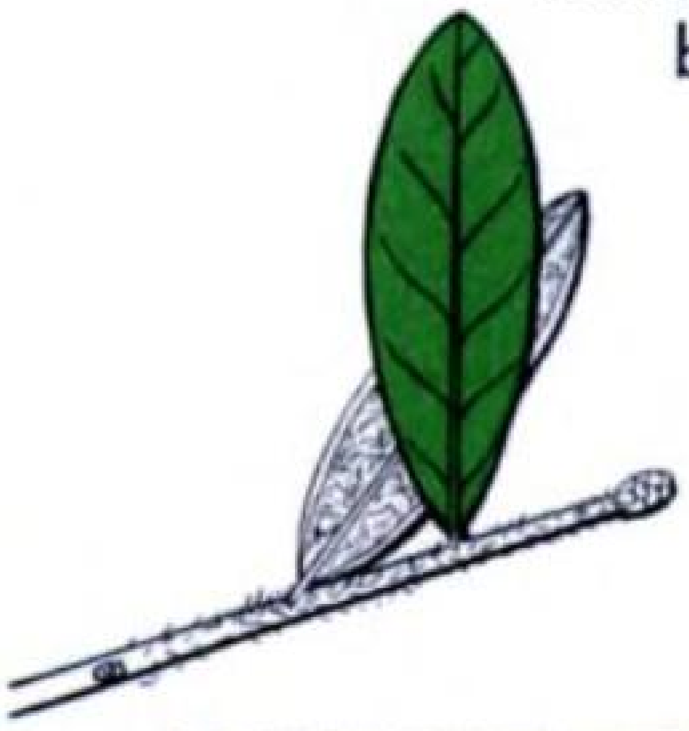

FETTERBUSH
A vein follows leaf edges

MOUNTAIN LAUREL

Leaves

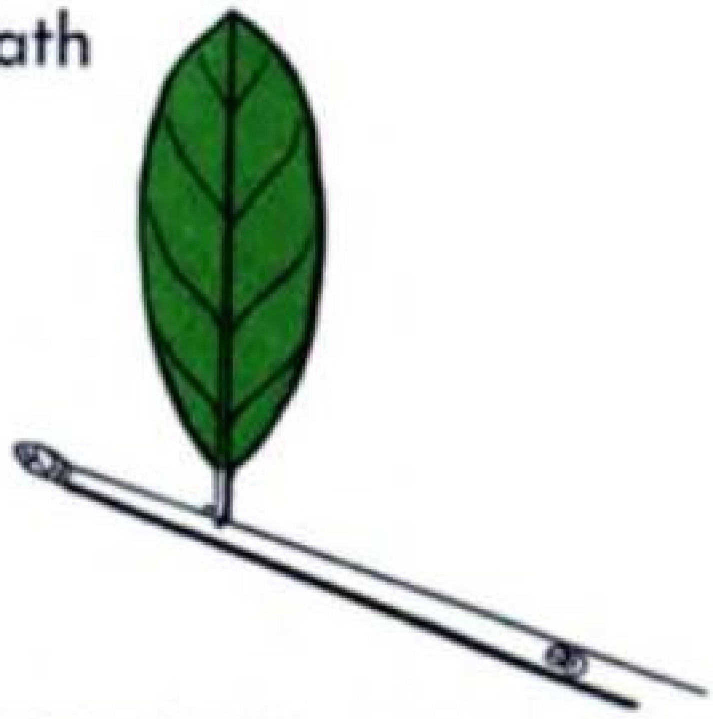
rusty or white-woolly beneath

yellow-scaly beneath



LABRADOR TEA

Low shrubs of acid bogs and Far North

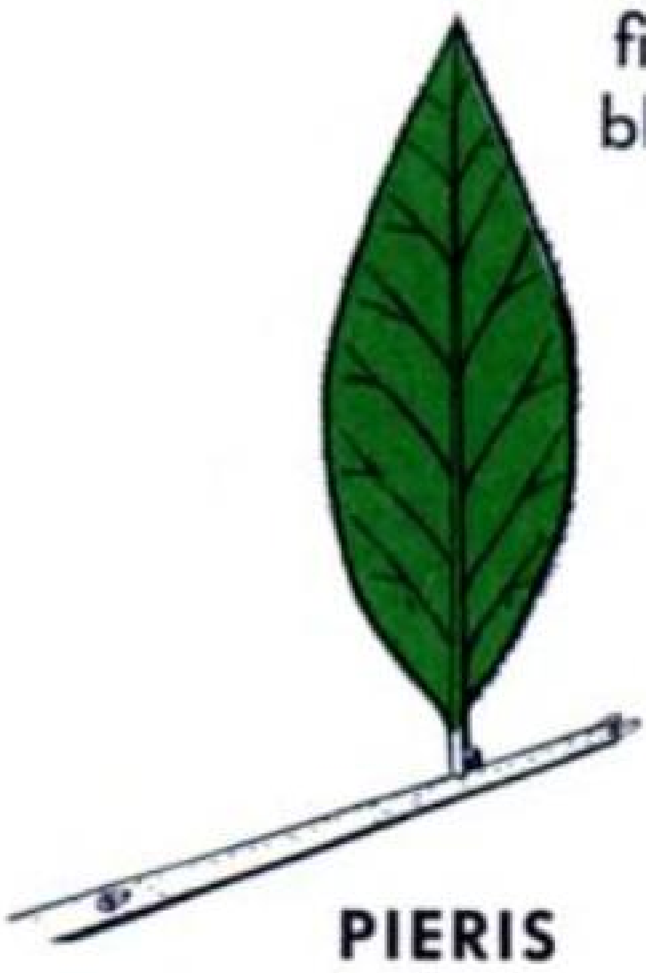


LEATHERLEAF

Leaves

fine-toothed, black-dotted, hairy beneath

not toothed, whitened, slightly hairy beneath

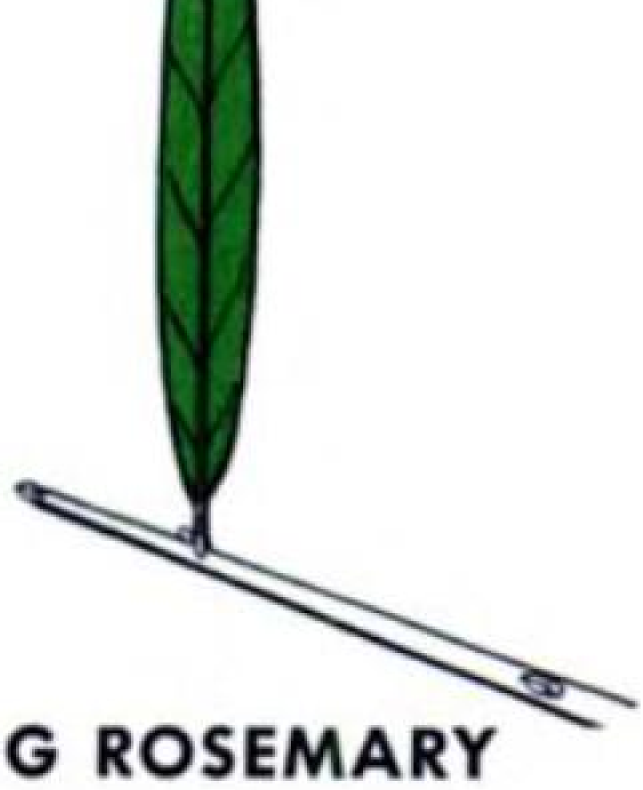


PIERIS

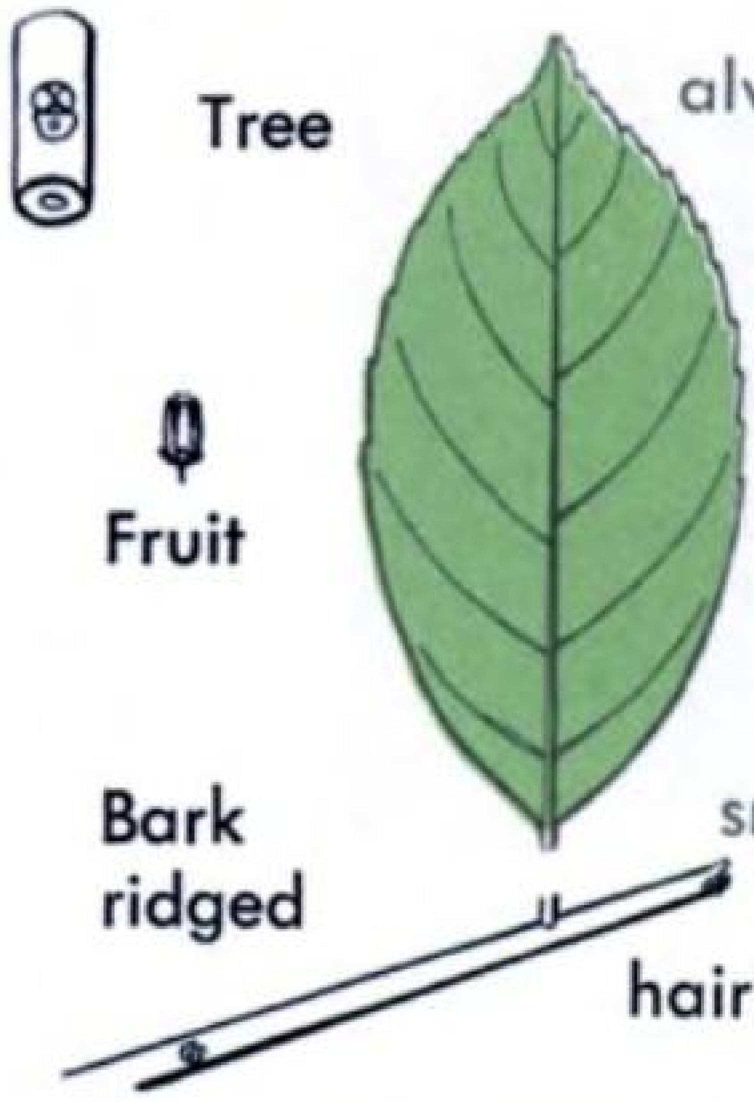
Low shrubs of

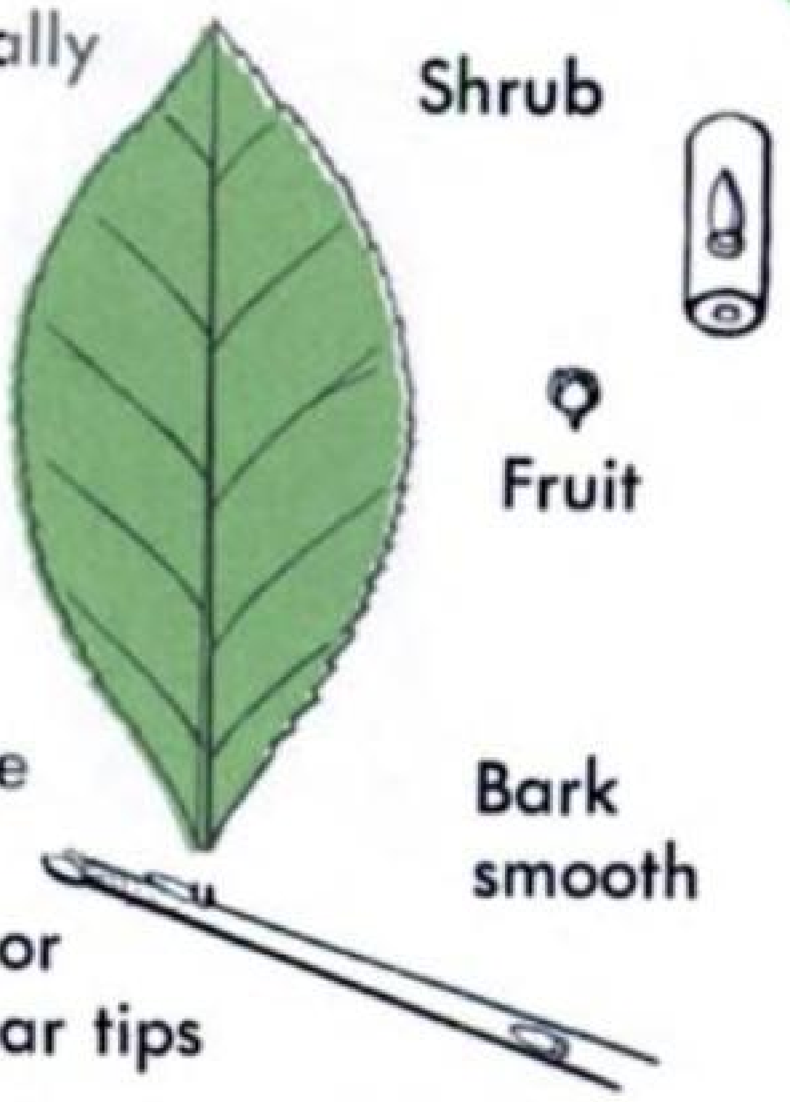
mountain slopes

acid bogs



BOG ROSEMARY





Tree always Leaves usually Shrub

fine-toothed

Fruits

5-parted capsules

Fruit 1-sided clusters open clusters Fruit

End buds false

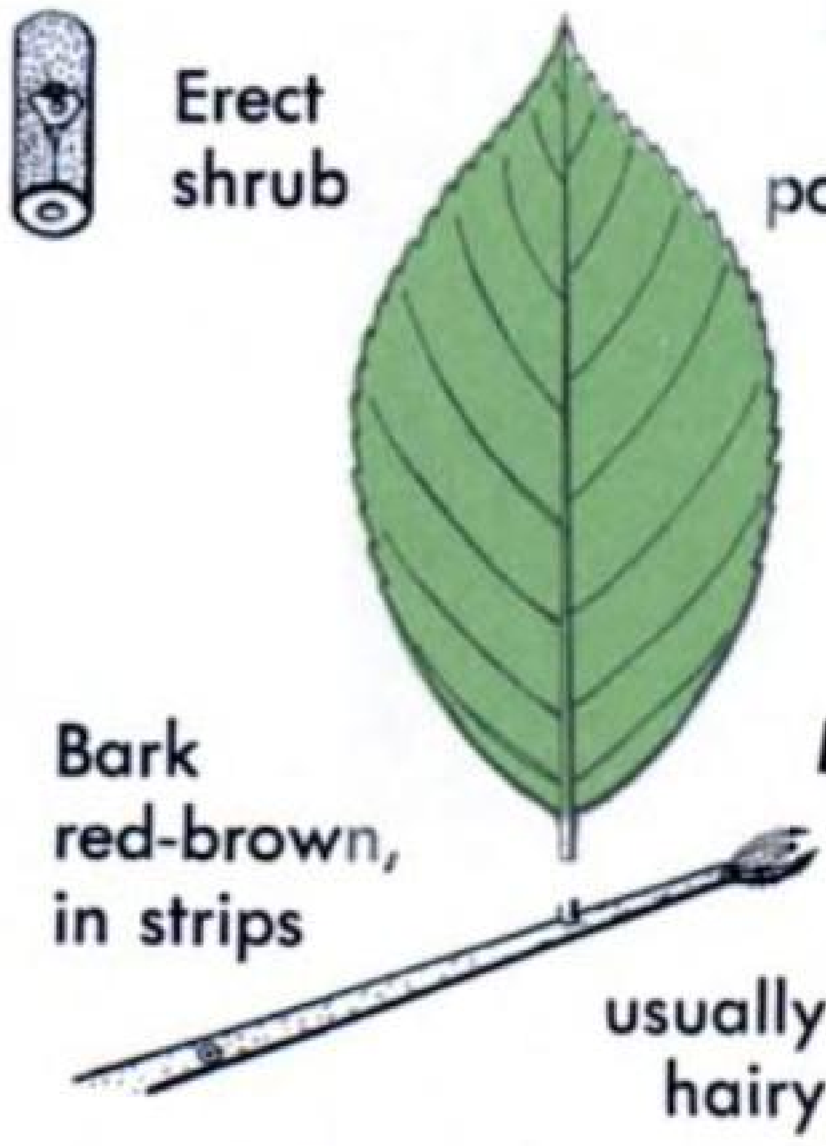
Side buds

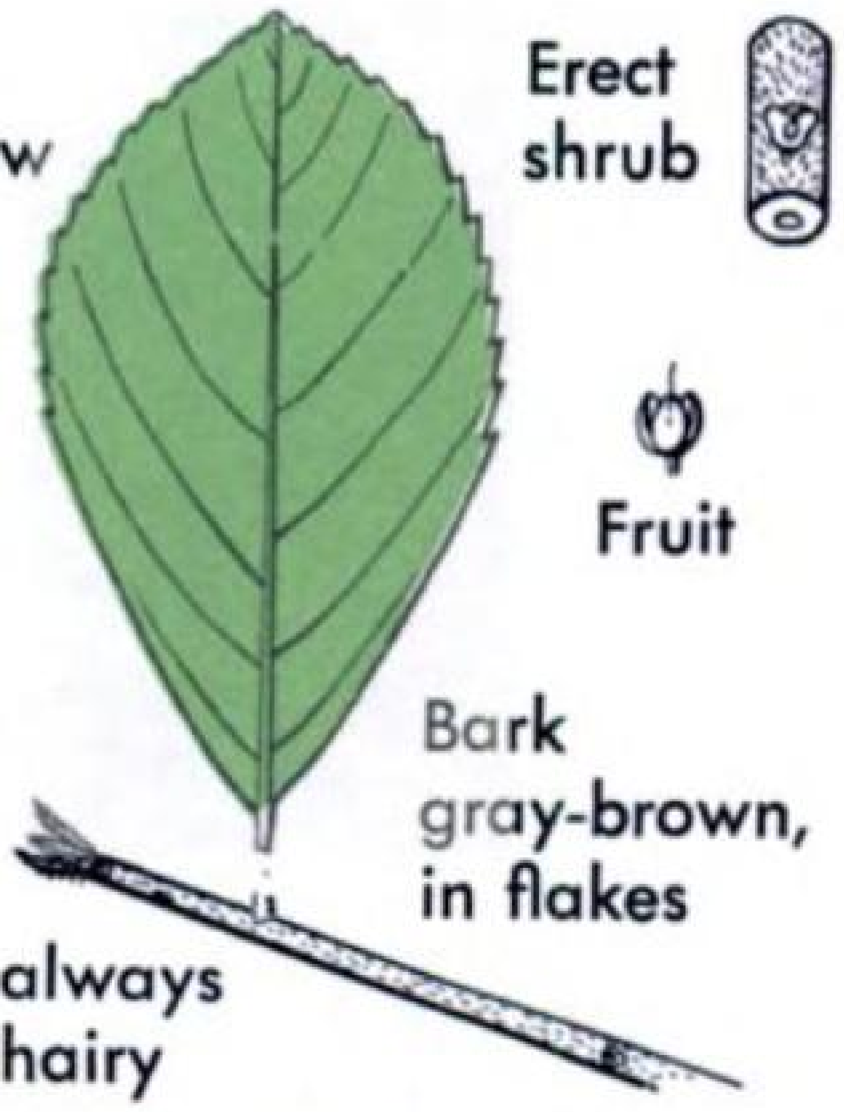
Bark ridged small large Bark smooth

Twigs

hairless hairless or hairy near tips

SOURWOOD **MALEBERRY**





Leaves fine-toothed

Erect shrub long-pointed base narrow Erect shrub

Fruits

3-parted capsules, Fruit

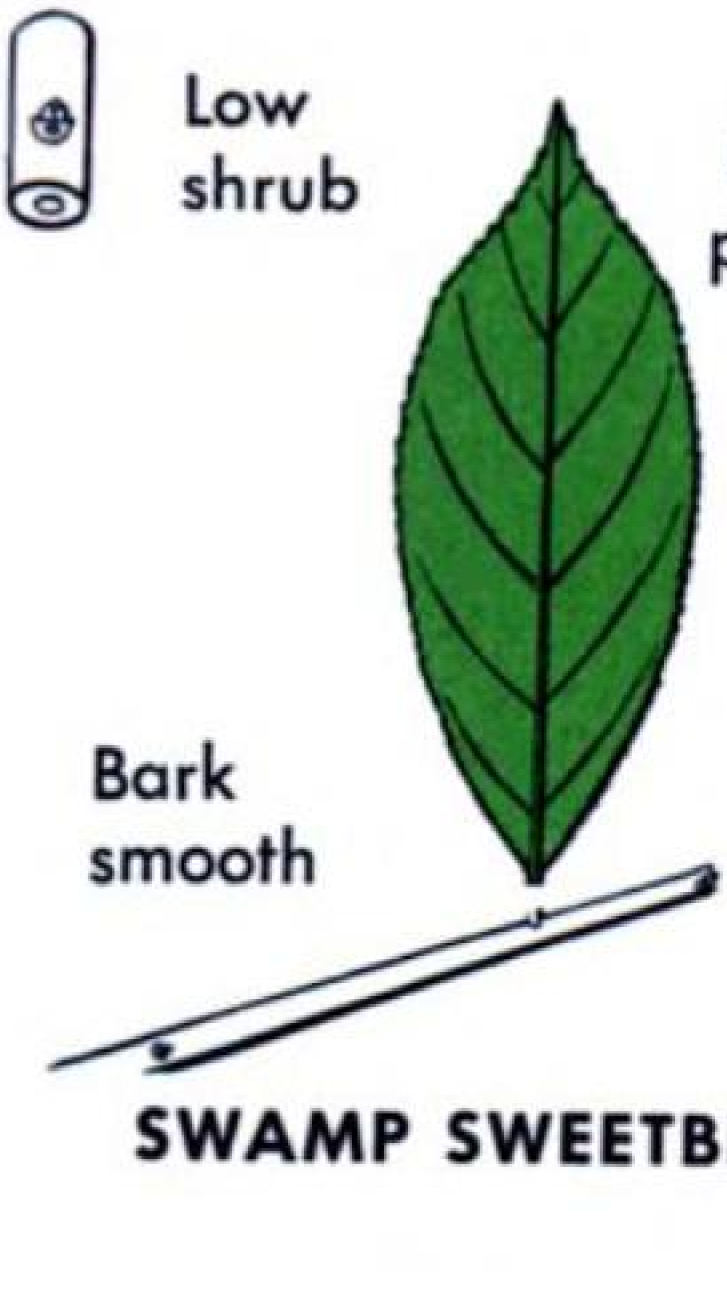
spikelike clusters

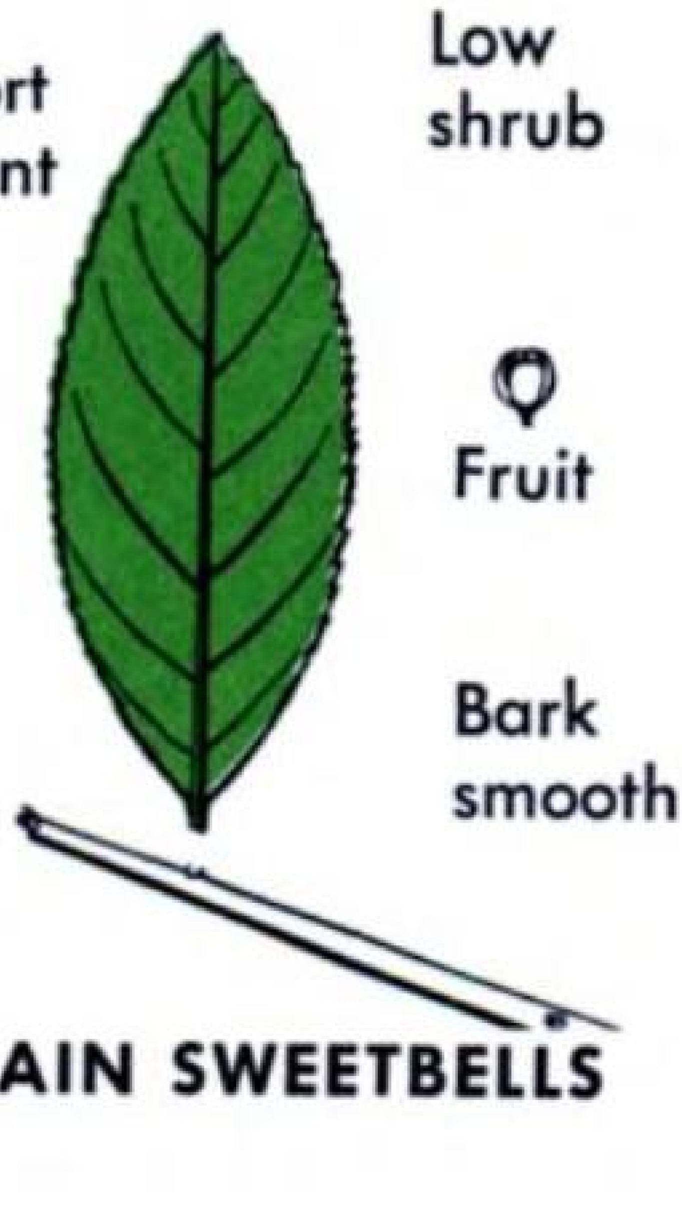
Bark red-brown, in strips ***End buds true, large*** Bark gray-brown, in flakes

Twigs

usually hairy always hairy

MOUNTAIN PEPPERBUSH **COAST PEPPERBUSH**





Leaves fine-toothed

Low shrub long point short point Low shrub

Fruits

5-parted capsules Fruit

in 1-sided clusters

End buds false

Bark smooth Side buds small Bark smooth

Twigs hairy or hairless

SWAMP SWEETBELLS **MOUNTAIN SWEETBELLS**

MISCELLANEOUS PLANTS WITH 1 BUNDLE SCAR (1)

"Bundle scars" are small marks within a leaf scar (see p. xxiv). These species have limited ranges (below) and have leaves that are sometimes or always toothed. Fruits variable.

♠V SWEETLEAF, *Symplocos tinctoria* p. 291
Swampy or sandy woods; mostly Coastal Plain, Delaware to w. N. Carolina and n. Florida, west to e. Texas, and north in Mississippi Valley to se. Tennessee, s. Arkansas, and se. Oklahoma.

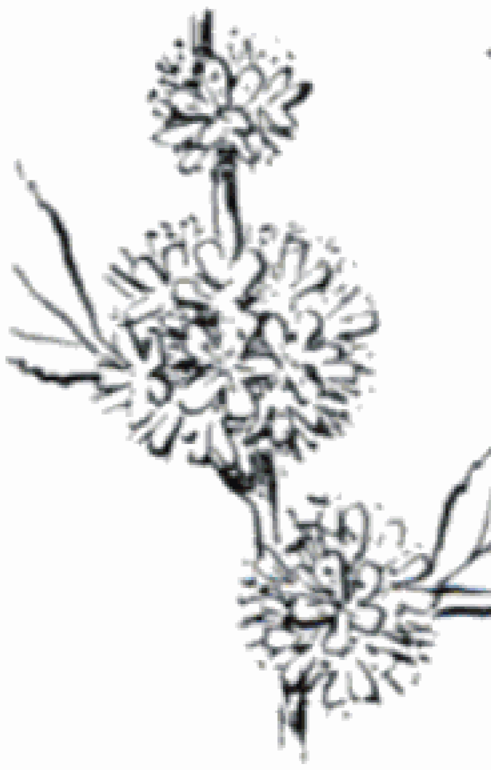
♠V SILVERBELL-TREE, *Halesia carolina* p. 291
Bottomlands and rich soils; Virginia, s. W. Virginia, s. Ohio, s. Illinois, se. Missouri, and se. Oklahoma to Florida and e. Texas.

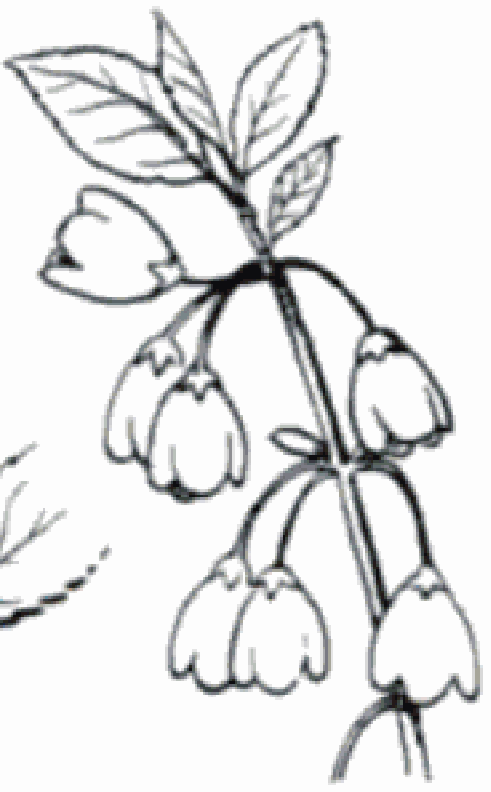
V AMERICAN SNOWBELL, *Styrax americana* p. 291
Wet Coastal Plain woods; se. Virginia to Florida, west to Texas, and north in Mississippi Valley to s. Ohio, s. Indiana, and s. Illinois, and se. Missouri.

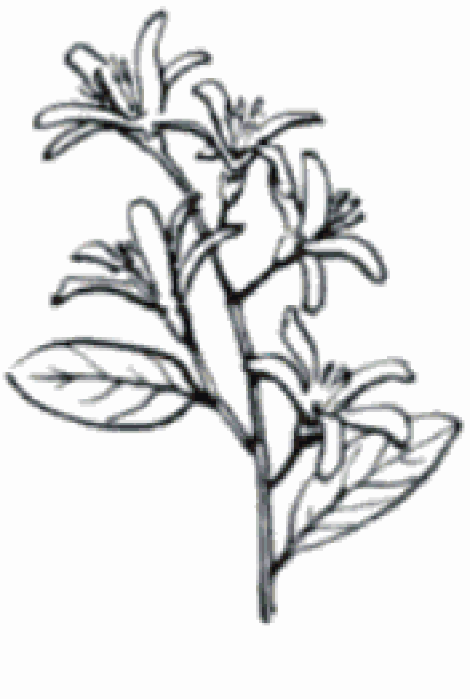
♠V BIGLEAF SNOWBELL, *Styrax grandifolia* p. 291
Coastal Plain bottomlands; s. Virginia to Florida, west to Louisiana, and north to w. Tennessee and Arkansas.

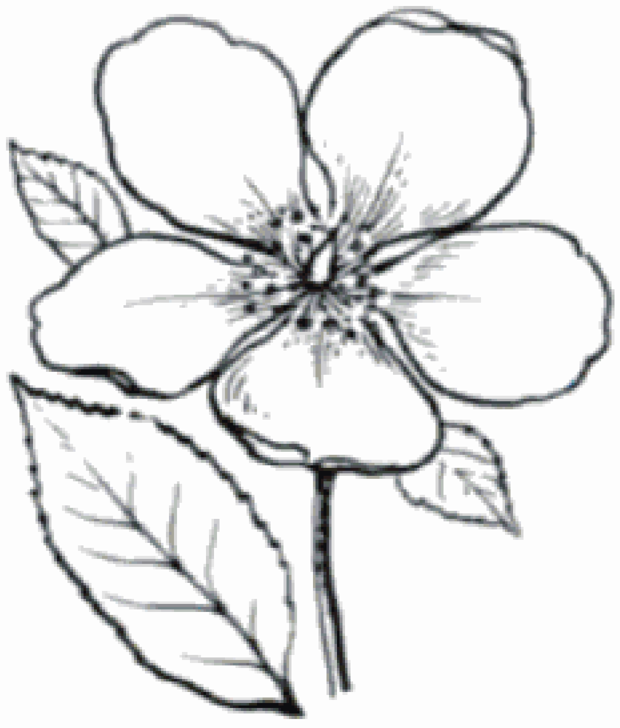
V SILKY-CAMELLIA, *Stewartia malachodendron* p. 291
Fertile Coastal Plain woods; e. Virginia to w. Florida and w. Louisiana; north in Mississippi Valley to w. Tennessee and e. Arkansas.

V MOUNTAIN-CAMELLIA, *Stewartia ovata* p. 292
Bottomlands in mountain forests; Virginia and se. Kentucky to centr. N. Carolina, n. Georgia, and n. Alabama.


SWEETLEAF


SILVERBELL-TREE

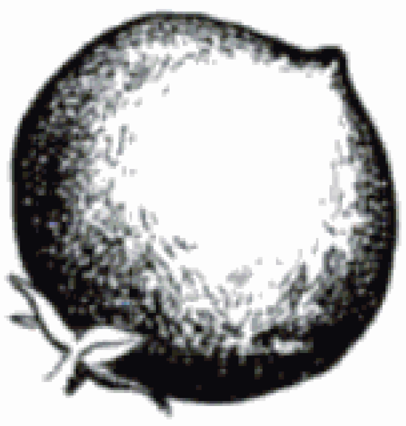

AMERICAN SNOWBELL


SILKY-CAMELLIA

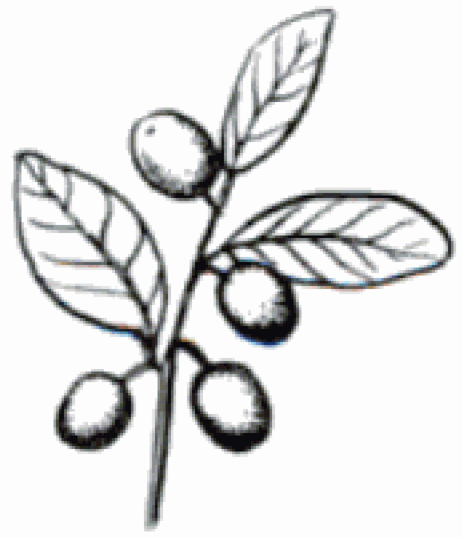
MISCELLANEOUS PLANTS WITH 1 BUNDLE SCAR (2)

"Bundle scars" are small marks within a leaf scar (see p. xxiv). These trees and shrubs have leaves wavy-edged or not toothed.

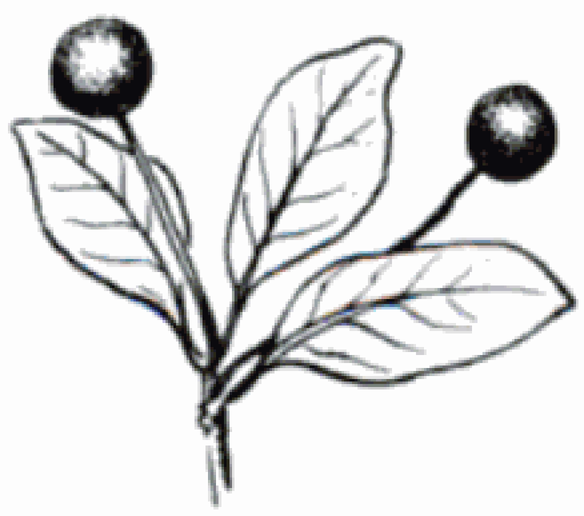
▲ PERSIMMON, *Diospyros virginiana* p. 292
Old fields and barren woods; Connecticut, s. New York, Pennsylvania, Ohio, Illinois, Missouri, and e. Kansas to Florida and e. Texas.
Ѵ AMERICAN SILVERBERRY p. 293
Elaeagnus commutata
Dry soils; e. Quebec and Alaska to sw. Quebec, Minnesota, S. Dakota, and Utah.
Ѵ AUTUMN-OLIVE, *E. umbellata* (not illus.) p. 293
Ѵ DAPHNE, *Daphne mezereum* p. 293
Escaped, especially on limestone soils; Newfoundland and s. Ontario to New England, New York, and Ohio.
Ѵ MOUNTAIN-HOLLY, *Nemopanthus mucronata* p. 294
Damp thickets and swamps; Newfoundland and Minnesota to w. Virginia, W. Virginia, Indiana, and n. Illinois.
Ѵ STAGGERBUSH, *Lyonia mariana* p. 294
Sandy or peaty soils; s. Rhode Island, se. New York, e. Pennsylvania, and Arkansas to Florida and e. Texas.
Ѵ ZENOBIA, *Zenobia pulverulenta* (not illus.) p. 294
Ѵ MINNIEBUSH, *Menziesia pilosa* p. 294
Wooded slopes; Pennsylvania and W. Virginia to Georgia.
Ѵ WHIN, *Genista tinctoria* (not illus.) p. 295
Ѵ ANDRACHNE, *Andrachne phyllanthoides* (not illus.) p. 295
Ѵ PONDSPICE, *Litsea aestivalis* p. 295
Swamps; se. Virginia and Tennessee to Florida and Louisiana.
Ѵ OILNUT, *Pyrularia pubera* p. 295
Mountain woods; Pennsylvania, W. Virginia, to Georgia and Alabama.
▲ REDBAY, *Persea borbonia* p. 295
Coastal swamps; s. Delaware to Florida and west to Texas.
Ѵ TITI, *Cyrilla racemiflora* p. 296
Coastal swamps; se. Virginia to Florida and west to Texas.



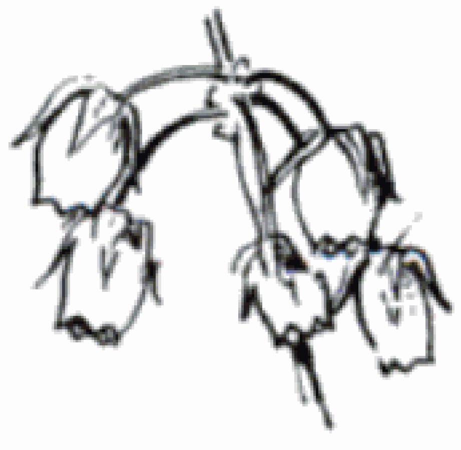
PERSIMMON



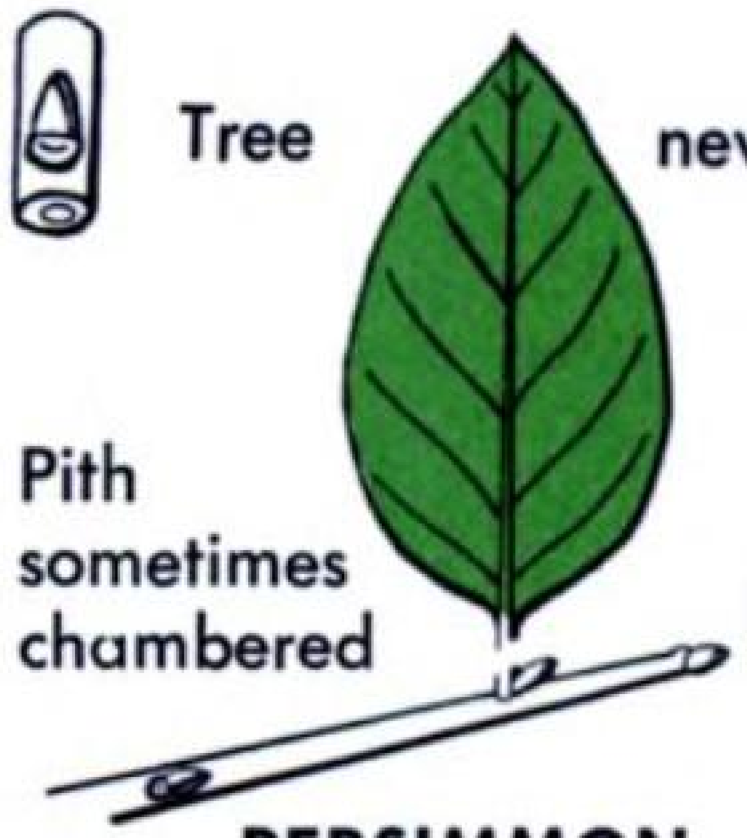
SILVERBERRY



MOUNTAIN-HOLLY



STAGGERBUSH



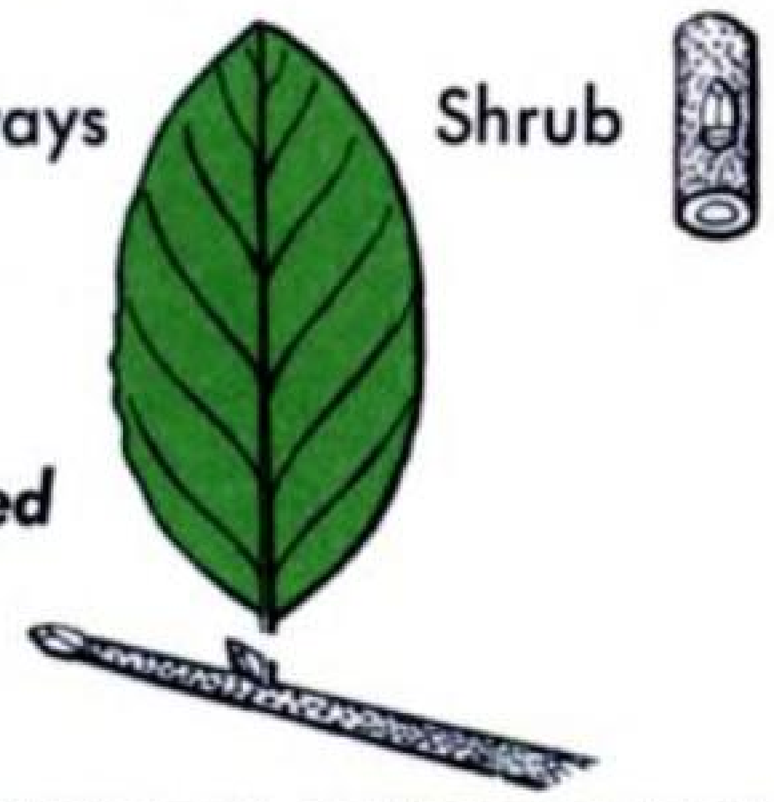
Tree

Pith sometimes chambered

PERSIMMON

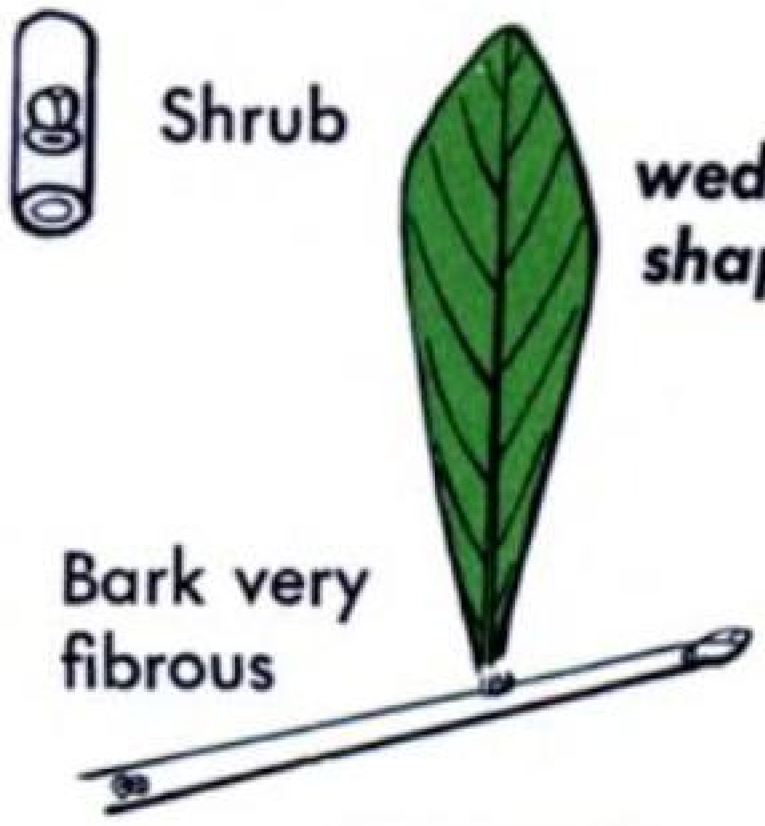
Leaves and twigs
never … always
speckled with
brown and silver

Buds
black, 2 scales … ***speckled***



Shrub

AMERICAN SILVERBERRY



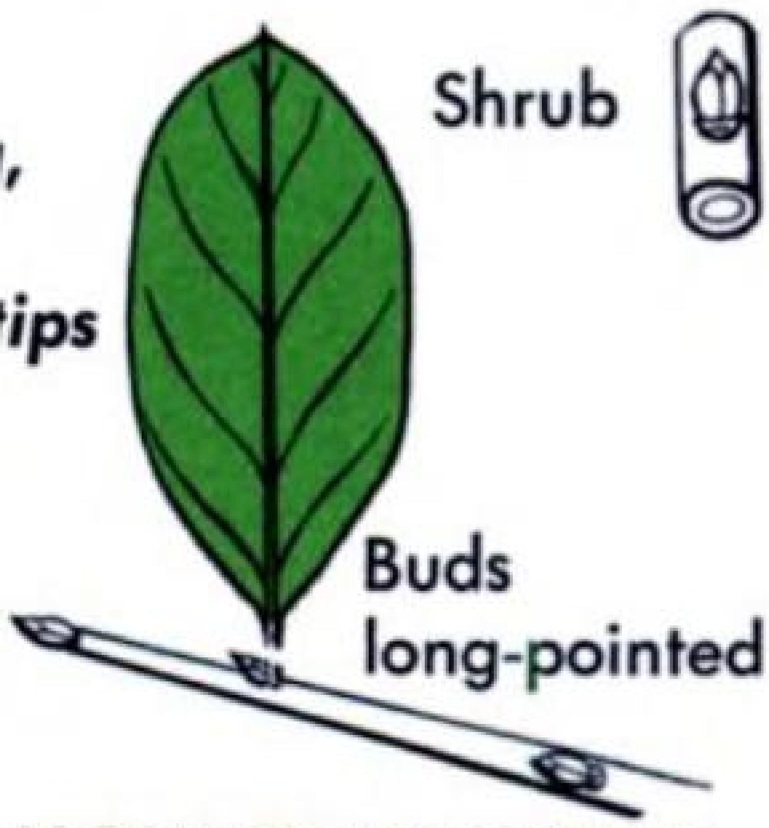
Shrub

Bark very fibrous

DAPHNE

Leaves
wedge-shaped … ***oblong, with sharp tips***

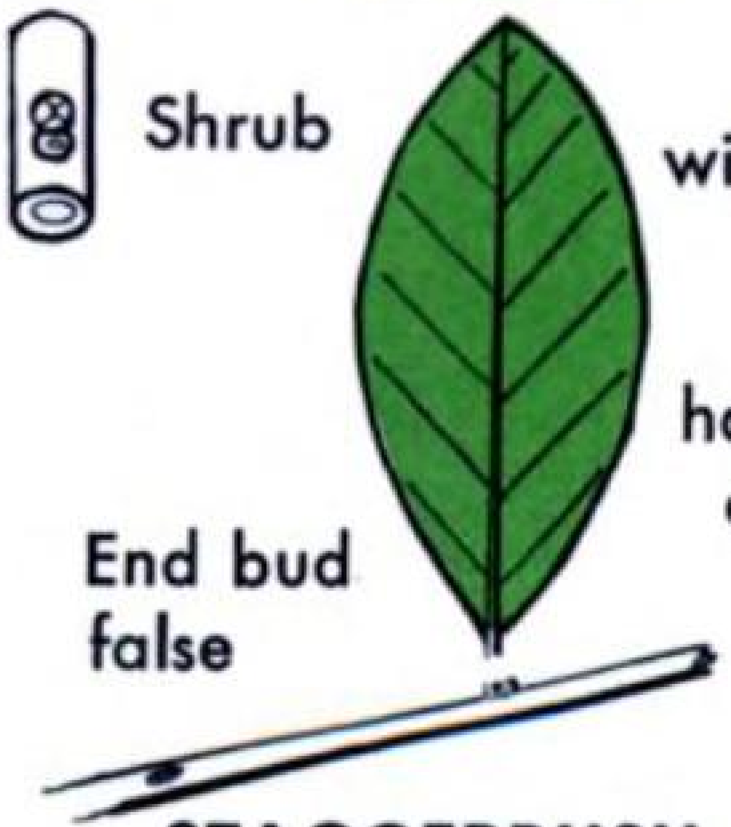
Fruits
red "berries"



Shrub

Buds long-pointed

MOUNTAIN-HOLLY



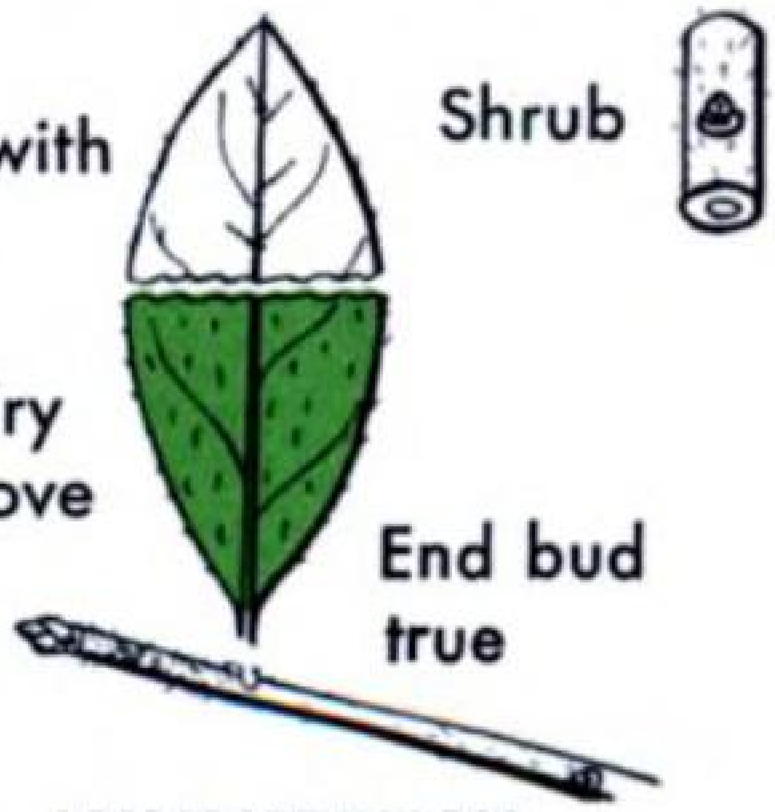
Shrub

End bud false

STAGGERBUSH

Leaves
without … with
long-hairy glands
on lower midvein
hairless above … hairy above

Fruits
dry capsules, often present



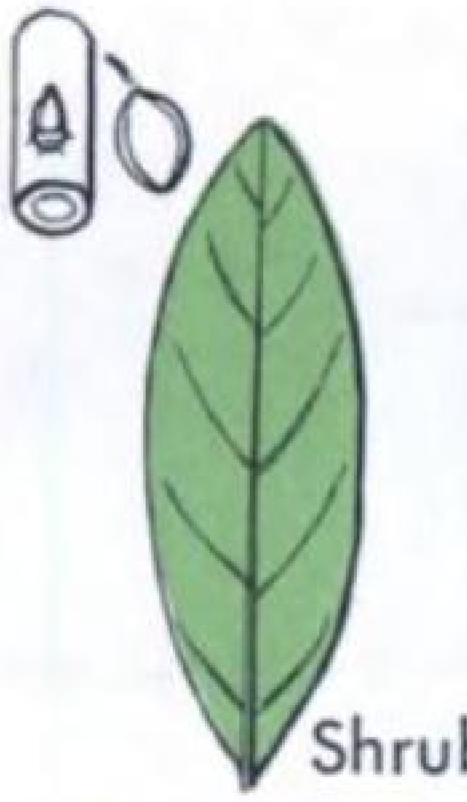
Shrub

End bud true

MINNIEBUSH

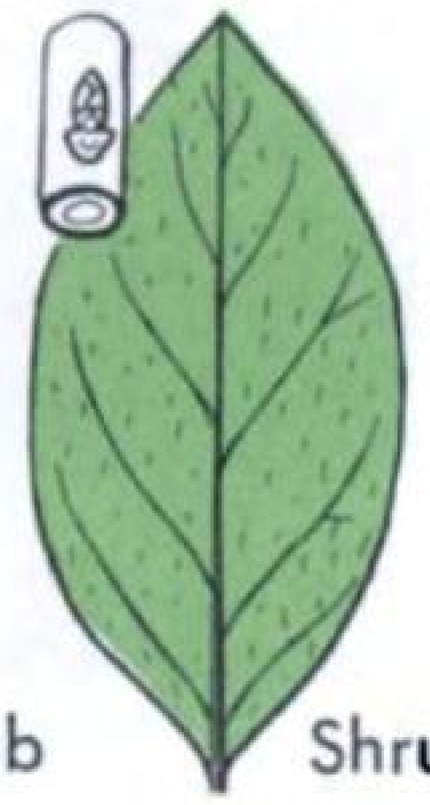
Leaves
thin or leathery, not evergreen … ***leathery, evergreen***

See text
for other details



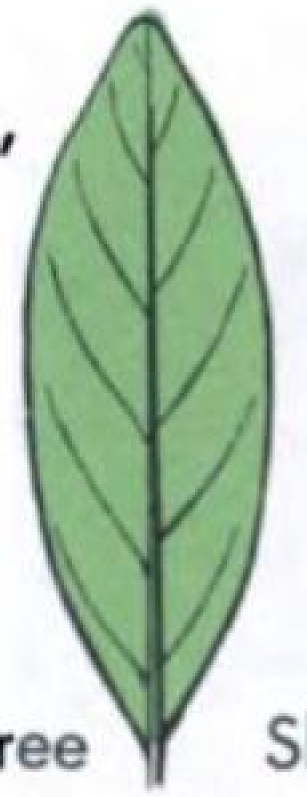
Shrub

PONDSPICE



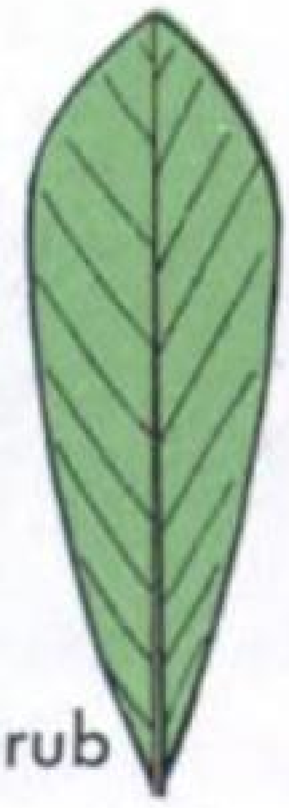
Shrub

OILNUT



Tree

REDBAY



Shrub

TITI

Appendixes
Index

Name *Plate*

- **14.** Scales not present at twig bases:
  - **15.** Twigs thorn-tipped **COMMON BUCKTHORN** 19
  - **15.** Twigs not thorn-tipped:
    - **16.** Buds globular; plants either parasitic or semi-aquatic:
      - **17.** Parasites on tree roots; s. Appalachians:
        - **18.** Twigs hairy; branchlets pale brown **BUCKLEYA** (16)
        - **18.** Twigs hairless; branchlets dark gray **NESTRONIA** (16)
      - **17.** Growing in shallow water or on wet soils:
        - **19.** Leaf scars and buds often in whorls of 3's; opposing leaf scars connected by lines; buds single above leaf scars:
          - **20.** Twigs rounded and smooth **BUTTONBUSH** 16
          - **20.** Twigs angular and ridged **SWAMP LOOSESTRIFE** (16)
        - **19.** Leaf scars and buds paired; leaf scars not connected by lines; buds often several above leaf scars **FORESTIERAS** 19
    - **16.** Buds elongate; nonparasitic upland plants:
      - **21.** Bud scales thick, fleshy; side buds with only 2–3 scales **LILACS** 18
      - **21.** Bud scales papery; side buds with 4 or more scales:
        - **22.** Twigs slender, 1/16″ or under; leaf scars much raised **PRIVETS** 16
        - **22.** Twigs stout, over 1/16″ thick; leaf scars not raised (at least top edges about flush with twigs) **FRINGE-TREE** 16

- **10.** Bundle scars 3:
  - **23.** Side buds hidden beneath leaf scars or bark:
    - **24.** Leaf scars raised above the twigs; bark of branchlets tight; tree **FLOWERING DOGWOOD** 15
    - **24.** Leaf scars not raised (at least upper edges about flush with twigs); bark of branchlets usually flaky; shrubs:
      - **25.** Plants of upland sites; twigs neither branched nor striated **MOCK-ORANGES** 19
      - **25.** Plants of coastal salt marshes and shores; twigs branched, finely lined **MARSH-ELDER** (19)
  - **23.** Side buds visible:
    - **26.** Upper leaf scars meeting in raised points (in salt marshes, see also Sea-oxeye, p. 81) **ASHLEAF MAPLE** 10
    - **26.** Upper leaf scars not meeting in raised points:
      - **27.** Paired leaf scars not connected by lines:
        - **28.** Twig tips usually thorny; inner bark yellow **COMMON BUCKTHORN** 19
        - **28.** Twig tips not thorny; inner bark not yellow:
          - **29.** Broken twigs with a spicy odor; twigs swollen near buds **ALLSPICES** 16
          - **29.** Broken twigs without a spicy odor; twigs not much swollen at buds:

Name *Plate*

30. Central end bud lacking, only a pair of buds at twig tips:

31. Pith white, bud scales 2–4, fruits balloonlike capsules **BLADDERNUT** 8

31. Pith brown, bud scales many, fruits small and juicy, berrylike **RED ELDERBERRY** 8

30. Central end bud present; 1 or 3 buds present at twig tips:

32. Bud scale 1; fruits small capsules containing many tiny, silky seeds **BASKET WILLOW** 56

32. Buds without scales or, if scaly, with 2 or more scales:

33. Bud scales more than 2:

34. Bud scales 6 or less (usually 4 or less); fruits fleshy with single flat seeds **VIBURNUMS** (2) 21

34. Bud scales mostly 6 or more; fruits dry, winged **MAPLES** 22

33. Bud scales 2 or none:

35. Leaf scars not U-shaped, nearly enclosing the buds **JAPANESE CORKTREE** (10)

35. Leaf scars U-shaped, adjacent to the buds:

36. Twigs hairy or trunk bark white-striped; bud scales 2; fruits dry, winged **MAPLES** 22

36. Twigs not hairy; trunk not white-striped; bud scales 2 or none; fruits fleshy, with single flat seeds **VIBURNUMS** (1) 20

27. Paired leaf scars connected by lines:

37. Papery scales present at twig bases:

38. Thin, hairy ridges descending along sides of twigs; bark not papery **BUSH-HONEYSUCKLES** 19

38. Twigs not ridged; bark papery:

39. Twigs stout, relatively inflexible; umbrellalike dried fruit clusters usually present in winter; low shrubs **HYDRANGEAS** 19

39. Twigs slender, relatively flexible; fruits are berries; low or tall shrubs **HONEYSUCKLES** (2) 14

37. No papery scales present at the bases of the twigs:

40. Bud scales more than 2:

41. Mostly shrubs; fruits fleshy with single flat seeds; bud scales 6 or less (usually 4 or less) **VIBURNUMS** (2) 21

41. Mostly trees; fruits dry, winged; bud scales mostly 6 or more **MAPLES** 22

40. Bud scales 2 or none:

42. Leaf scars raised above the twigs; bud scales 2 **DOGWOODS** 15

42. Leaf scars usually not much raised above the twigs:

43. Twigs hairy or trunk bark white-striped; bud scales 2; fruits dry, winged **MAPLES** 22

43. Twigs not hairy; trunk not white-striped; bud scales 2 or none; fruits fleshy with single flat seeds **VIBURNUMS** (1) 20

Division A (*contd.*)	*Name*	*Plate*
5. Buds covered by a single scale	**DWARF WILLOWS**	**32**
5. Buds covered by more than 1 scale:		
6. Buds covered by 2–3 scales	**BIRCHES**	**52**
6. Buds covered by more numerous scales:		
7. End buds false	**PLUMS**	**53**
7. End buds true:		
8. Older bark usually shreddy; leaf scars very narrow; broken twigs mostly with foul odor; mostly in swamps	**CURRANTS**	**41**
8. Older bark not shreddy; leaf scars not very narrow:		
9. Twigs speckled; broken twigs with sour odor	**SAND CHERRY**	**32**
9. Twigs not speckled; broken twigs without sour odor	**MOUNTAIN ALDER**	**51**

DIVISION B

Climbing or sprawling vines

(CAUTION: Watch for Poison-ivy)

10. Vines climbing by aerial rootlets; *poisonous*	**POISON-IVY**	**25**
10. Vines without aerial rootlets; nonpoisonous:		
11. Vines climbing by tendrils:		
12. Tendrils attached to old leaf bases; twigs green and without distinct pith; stems mostly prickly or bristly	**GREENBRIERS**	**33**
12. Tendrils attached to twigs; twigs not green; pith distinct; stems not prickly:		
13. Pith brown, woody partitions usually present	**GRAPES (1), (2), etc.**	**34, 35**
13. Pith white, without pith partitions:		
14. Tendrils not forked	**AMPELOPSIS**	**35**
14. Tendrils forked:		
15. Tendril tips very slender, often disk-tipped	**BOSTON IVY, CREEPERS**	**(35), 30**
15. Tendril tips stout; not disk-tipped:		
16. Tendrils present mostly near the branch tips	**PEPPER VINE**	**31**
16. Tendrils more frequent	**CISSUS**	**(25)**
11. Vines without tendrils:		
17. Prickly; trailing or climbing	**BRAMBLES**	**23**
17. Not prickly; climbing by twining stems:		
18. Leaf scars flanked by knobby growths	**WISTERIAS**	**30**
18. Leaf scars not so flanked:		
19. Leaf scars with more than 3 bundle scars	**MOONSEEDS**	**36**
19. Leaf scars with 1–3 bundle scars	**MISCELLANEOUS**	**37**

Division D (*contd.*) *Name* *Plate*

- **48.** Side buds not so hidden:
  - **49.** Leaf scars nearly encircling twigs; wood yellow **YELLOWROOT** 31
  - **49.** Leaf scars restricted to half the twig circumference or less; wood rarely yellow (see Yellowwood):
    - **50.** Buds nearly or completely surrounded by leaf scars:
      - **51.** Buds completely surrounded by leaf scars; bark very tough and leathery **LEATHERWOOD** 59
      - **51.** Buds nearly surrounded by deeply U- or V-shaped leaf scars; bark normal:
        - **52.** Bundle scars usually 5, projecting; sap not milky; wood of twigs yellow **YELLOWWOOD** 30
        - **52.** Bundle scars more than 5, not projecting; sap milky; wood of twigs not yellow **SUMACS** 26
    - **50.** Buds located above leaf scars:
      - **53.** End buds without scales and much larger than side ones; buds wine-red **PAWPAWS** 59
      - **53.** Buds scaly:
        - **54.** Visible bud scales only 2–3:
          - **55.** Twigs stout, relatively inflexible; end buds false:
            - **56.** Leaf scars 3-lobed **CHINABERRY** (31)
            - **56.** Leaf scars crescent-shaped; *poisonous* **POISON SUMAC** 26
          - **55.** Twigs slender, flexible; end buds true or false:
            - **57.** Pith partitioned near each leaf scar:
              - **58.** Twigs smooth or shreddy; mostly vines **GRAPES** (1), (2) 34, 35
              - **58.** Twigs with sandpapery surfaces; shrub or tree **PAPER-MULBERRY** 43
            - **57.** Pith solid:
              - **59.** Leaf scars narrow; bundle scars in a line; end buds true **MOUNTAIN-ASHES** 27
              - **59.** Leaf scars oval or triangular; bundle scars not in a line; end buds false:
                - **60.** Buds red or green, usually sharp; inner bark fibrous **BASSWOODS** 43
                - **60.** Buds brownish, usually blunt; inner bark weak **CHESTNUTS** 57
        - **54.** Buds with 4 or more visible scales:
          - **61.** Stems very long-bristly or bristly-hairy; end buds true **BRISTLY SARSAPARILLA** 24
          - **61.** Stems not bristly, though some hairy:
            - **62.** End buds true; twigs with lines leading from leaf scars **NINEBARK** 42
            - **62.** End buds false; twigs not lined:
              - **63.** Bud scales in 2 rows; sap milky **MULBERRIES** 43
              - **63.** Bud scales not in 2 rows or lower 2 paired; sap clear **HAZELNUTS** 51

DIVISION E

Upright trees and shrubs with nonthorny twigs and leaf scars with 3 bundle scars (see Division D for plants with numerous bundle scars collected in 3 groups)

Name *Plate*

64. Pith chambered:
65. Twigs stout; leaf scars large, shield-shaped **WALNUTS** 27
65. Twigs slender; leaf scars small, not shield-shaped:
66. Twigs green; fruits small dry pods in clusters; shrub **SWEET-SPIRES** 59
66. Twigs brownish; fruits berrylike; trees:
67. End buds false; fruits dry when ripe **HACKBERRIES** 43
67. End buds true; fruits fleshy **SOUR-GUMS** 59
64. Pith continuous:
68. Buds without scales; hairy:
69. Buds stalked, with slender bases:
70. Fruit pods in short clumps **WITCH-HAZELS** 57
70. Fruit pods in long clusters **WITCH-ALDER** (57)
69. Buds not stalked **BUCKTHORNS** 58
68. Buds with 1 or more scales:
71. Twigs with small yellow resin-dots evident (use lens):
72. Buds short, blunt **WAXMYRTLES** 57
72. Buds long, slender **CURRANTS** 41
71. Twigs without resin-dots (use lens):
73. Leaf scars like a narrow line half encircling twigs; plants bramblelike **ROSES** 23
73. Leaf scars wider; plants not bramblelike:
74. End buds true:
75. Buds with 1–3 visible scales (or if 4 scales, then buds somewhat long-pointed):
76. Buds with single caplike scale **WILLOWS (1), (2)** 55, 56
76. Buds with more than 1 scale:
77. Buds narrowed conspicuously at base (stalked); bud scales 2–3, reddish **ALDERS** 51
77. Buds not stalked (sessile):
78. Older branchlets with leaf-scar-crowded spur branches; bud scales 2–3, not paired:
79. Bark usually with narrow cross stripes **BIRCHES** 52
79. Bark not striped **APPLES** 58
78. Older branchlets without spur branches; bud scales 2–4, paired (see also Bladder-senna, p. 144)
80. Bud scales 2; leaf scars crowded toward twig tips **ALTERNATE-LEAF DOGWOOD** 59
80. Bud scales 2 or 4, somewhat long-pointed; leaf scars not crowded toward twig tips **SMOKETREE** 59
75. Buds with 4 or more visible scales:

Division E (contd.) *Name* *Plate*

81. Buds ball-shaped, some thorns over 1″ usually present **HAWTHORNS** **39**

81. Buds longer than broad:

82. Buds with lowermost scale immediately above leaf scar; bark often smooth and greenish on young trunks and branches; trees **POPLARS** **44**

82. Lowest bud scale not so aligned:

83. Branchlets often with corky "wings"; bud scales hairy-fringed; tree **SWEETGUM** **42**

83. Branchlets without corky wings:

84. Twigs nearly encircled by narrow stipule scars near leaf scars; buds very long, slim **BEECH** **57**

84. Twigs without encircling stipule scars:

85. End buds much larger than side buds and clustered at twig tips; s. Missouri southward **CORKWOOD** **59**

85. End buds about same size as side buds, clustered only in some cherries:

86. Twigs with obvious long lines leading from each end of the leaf scar and bark papery, shreddy:

87. Twigs with 3 lines descending from each leaf scar; yellow resin-dots lacking **NINEBARK** **42**

87. Twigs with only 2 descending lines or if with 3 then with resin-dots (use lens) **CURRANTS** **41**

86. Twigs without long (but sometimes with short) lines from leaf scars; bark not papery or shreddy:

88. Buds reddish, slender:

89. Bud scales often twisted with black tips (use lens); shrubs or small trees **JUNEBERRIES** **54**

89. Bud scales not twisted but with tips notched (use lens); shrubs **CHOKEBERRIES** **58**

88. Buds not reddish or, if so, then stout, or at least not slender:

90. Older bark usually with narrow cross stripes; trees or shrubs **CHERRIES** **53**

90. Older bark not cross-striped:

91. Bud scales paired, 2–4 **B.-SENNA, SMOKETREE** **(30), 59**

91. Bud scales not paired:

92. Leaf scars narrow; trees or shrubs **APPLES** **38, 58**

92. Leaf scars deeper; northern shrub **MOUNTAIN ALDER** **51**

74. End buds false:

93. Buds with 2–3 visible scales:

Division E (contd.) *Name* *Plate*

94. Twigs stout; leaf scars large; buds small, round; trees (see also Hoptree and Albizzia, below):

95. Buds often several at each leaf scar, 1 above another:

96. Buds imbedded in bark; twigs whitish; pith pink **COFFEE-TREE** 31

96. Buds raised; twigs not whitish; pith whitish **WESTERN SOAPBERRY** (30)

95. Buds single; raised; leaf scar 3-lobed; pith white **CHINABERRY** (31)

94. Twigs slender; leaf scars smaller; buds various; trees and shrubs:

97. Broken twigs spicy-aromatic; buds clustered **SPICEBUSHES** 59

97. Broken twigs not aromatic:

98. Leaf scars U-shaped; buds hairy **HOPTREE** 25

98. Leaf scars otherwise:

99. Twigs deeply grooved; occurring at edges of salt water **GROUNDSEL-TREE** 58

99. Twigs not grooved; mostly on uplands:

100. Twigs usually red or green; inner bark tough and fibrous **BASSWOODS** 43

100. Not as above:

101. Buds as wide as long **ALBIZZIA** 31

101. Buds considerably longer than broad:

102. Pith irregular in cross section **CHESTNUTS** 57

102. Pith nearly circular or oval in cross section **INDIGOBUSHES** 30

93. Buds with 4 or more visible scales:

103. Broken twigs with spicy odor; twigs hairy; low shrub **SWEETFERN** 57

103. Broken twigs not spicy-aromatic:

104. Buds short, blunt, ball-like; plant usually long-thorny **HAWTHORNS** 39

104. Buds mostly longer, not ball-like; not thorny:

105. Dry clustered remains of tiny fruit capsules usually present; twigs and buds hairy; low shrubs **NEW JERSEY TEAS** 43

105. Fruit remains, if present, larger, not capsular:

106. Leaf scars raised with 2 obvious longish lines leading from sides of their bases:

107. Leaf scars with upper edge often fringed; some buds narrow at base; a 3rd line sometimes leading from centers of leaf-scar bases **REDBUD** 43

107. Leaf scars not fringed; buds not stalked; only 2 lines:

108. Buds narrow, often sharp; broken twigs with sour odor; trunk bark often with cross stripes **PLUMS** 38, 53

108. Buds broad, mostly blunt; broken twigs without sour

Division E (contd.) *Name* *Plate*

odor; trunk bark not striped **APPLES, PEARS** 38, 58

106. Leaf scars not raised or at least without obvious lines leading from them:

109. Scales of buds in regular vertical rows:

110. Bud scales in 2 rows; buds round in cross section; some species with "winged" branchlets; trunk ridged **ELMS** 50

110. Bud scales in 4 rows; buds 4-angled; branchlets not winged; trunk smooth, "muscular" **IRONWOOD** 51

109. Scales of buds not in regular rows; buds round in cross section:

111. Buds pressed tightly against twigs; pith sometimes chambered **HACKBERRIES** 43

111. Buds not tightly pressed; pith continuous:

112. Leaf scars in 2 regular rows along twigs:

113. Buds sharp; scales finely grooved (use lens); trunk scaly; tree **HORNBEAM** 51

113. Buds blunt; bud scales not grooved (use lens); stems not scaly; shrubs **HAZELNUTS** 51

112. Leaf scars less regularly placed:

114. Bud scales blackish, dark **BUCKTHORNS** 58

114. Bud scales brown, lighter **PLUMS** 38, 53

DIVISION F

Upright trees and shrubs with nonthorny twigs and with leaf scars either lacking or with 1 bundle scar

115. Leaf scars lacking:

116. Trees with fibrous bark; twigs and needlelike foliage dropping in winter leaving no leaf scars; fruits ball-shaped cones **BALDCYPRESS** 3

116. Shrubs, rambling and thornless with thin flaky bark; leaves breaking off above base, 3 bundle scars evident only if leaf base is cut transversely **FLOWERING RASPBERRIES** 42

115. Leaf scars present, with 1 bundle scar:

117. Leaves needlelike, clustered, falling in winter; "warty" spur branches present; fruits cones **LARCHES** 2

117. Leaves not needlelike but falling in winter; fruits not cones:

118. Pith chambered:

119. Buds with only 2 visible scales, blackish **PERSIMMON** 68

119. Buds with more than 2 visible scales:

120. Bark white-striped; buds reddish **SILVERBELL-TREE** 67

120. Bark not striped; buds dark **SWEETLEAF** 67

118. Pith continuous:

121. Twigs covered with silver and brown scales **SILVERBERRIES** 68

Division F (contd.) *Name* *Plate*

121. Twigs without such scales:

122. Broken twigs with very tough leathery bark **DAPHNE** **68**

122. Twig bark not especially tough:

123. Buds without scales **SNOWBELLS** **67**

123. Buds covered by scales:

124. Broken twigs spicy-aromatic:

125. In southern swamps; twigs not branched **PONDSPICE** **68**

125. In uplands, widespread; twigs often branched **SASSAFRAS** **43**

124. Broken twigs not spicy-aromatic:

126. End buds false:

127. Twigs covered with numerous, fine, granular speckles (sometimes partly obscured by hairiness); twigs usually green or reddish; buds mostly with 2–3 visible scales; shrubs **BLUEBERRIES** **62**

127. Twigs not warty-granular:

128. Buds with 2 visible scales:

129. Buds blackish; pith spongy or chambered **PERSIMMON** **68**

129. Buds not blackish; pith continuous:

130. Fruits fleshy berries; twigs hairy or flattened and ridged or older bark shreddy **HUCKLEBERRIES** **63**

130. Fruits dry capsules; twigs neither hairy nor flattened and ridged; older bark not shreddy:

131. Buds blunt **ZENOBIA** **(68)**

131. Buds mostly sharp **MALEBERRY** **66**

128. Buds, 3 or more visible scales:

132. Leaf scars conspicuously raised, often with descending lines at sides; twigs very slender; clustered small dry fruits common at twig tips **SPIREAS** **60**

132. Leaf scars not conspicuously raised, without lines at sides:

133. Tree; buds small; ball-shaped; fruits small dry capsules **SOURWOOD** **66**

Division F (contd.) *Name* *Plate*

- **133.** Shrubs:
  - **134.** Twigs usually with reddish, catkinlike bud clusters; fruits dry capsules **SWEETBELLS** **66**
  - **134.** Twigs without catkinlike bud clusters:
    - **135.** Buds ball-shaped or conical; fruits dry capsules:
      - **136.** Twigs grayish **STAGGERBUSH** **68**
      - **136.** Twigs reddish **ZENOBIA** (68)
    - **135.** Buds longer; fruits not capsules:
      - **137.** Southwestern; fruits beanlike pods **PRAIRIE ACACIA** (31)
      - **137.** Widespread; fruits fleshy berries **HUCKLEBERRIES** **63**

- **126.** End buds true:
  - **138.** End buds much larger than side buds; buds usually clustered toward twig tips; side buds with 2–3 scales; shrubs:
    - **139.** Outer bud scales of end buds about as long as buds, hairy, often falling early **PEPPERBUSHES** **66**
    - **139.** Outer bud scales shorter than buds, not falling early:
      - **140.** Branchlets with shreddy bark **MINNIEBUSH** **68**
      - **140.** Branchlets with tight bark **AZALEAS** **64**
  - **138.** End buds about size of side buds:
    - **141.** Spur branches usually present; very tiny, black, sharp stipules flanking each leaf scar (use lens); buds often clustered toward twig tips; trees or shrubs **HOLLIES** **61**
    - **141.** Spur branches and stipules of this type absent; buds variable; shrubs:
      - **142.** Buds with 2–3 visible scales:
        - **143.** Twigs angled with long ridges:
          - **144.** Usually scrambling, vinelike **MATRIMONY-VINES** **37**
          - **144.** Upright shrubs **WHIN, ANDRACHNE** (68)
        - **143.** Twigs neither angled nor ridged:
          - **145.** Buds hairy, tapering; Virginia southward **SILKY-, MOUNTAIN-CAMELLIAS** **67**
          - **145.** Buds hairless **BLADDER-SENNA** (30) **MOUNTAIN-HOLLY** **68**
      - **142.** Buds with 4 or more visible scales:
        - **146.** Twigs sharply ridged, green, often dying at tips:
          - **147.** Dense bushy shrub **SCOTCH BROOM** **25**
          - **147.** Weak slender shrub **BICOLOR LESPEDEZA** (25)
        - **146.** Twigs not ridged:
          - **148.** Buds clasped at base by raised leaf scars and stipules **SHRUBBY CINQUEFOIL, etc.** **30**

Division F (*contd.*) *Name* *Plate*

148. Buds not clasped at base:
  149. Twigs very slender, often tipped with flat or cone-shaped clusters of small dry fruits; clumped shrubs **SPIREAS** **60**
  149. Twigs less slender; clusters of dry fruits may be present:
    150. Buds large, greenish; plants parasitic on roots of other shrubs or trees; fruits large, nutlike; Appalachians **OILNUT** **68**
    150. Buds small, not greenish; plants not parasitic; fruits small, dry capsules **NEW JERSEY TEAS** **43**

APPENDIX C

Key to Trees in Leafy Condition

FOR USE only in identifying specimens at least 25 feet tall, thus excluding shrubs. Plate numbers in parentheses indicate that the plants are included but not illustrated in connection with the plate specified.

	Name	*Plate*
1. Leaves needlelike or very small and scalelike; mostly cone-bearers (Section I):		
2. Leaves long, needlelike:		
3. Needles in bundles or groups along twigs	**PINES, LARCHES**	**1, 2**
3. Needles occurring singly:		
4. Needles blunt, flat	**FIRS, etc.**	**3**
4. Needles sharp:		
5. Needles 4-sided, neither in opposing pairs nor in whorls of 3	**SPRUCES**	**4**
5. Needles 3-sided; either in opposing pairs or in whorls of 3	**JUNIPERS**	**5**
2. Leaves very small and scalelike, hugging twigs:		
6. Leaves blunt; conifers	**WHITE CEDARS**	**5**
6. Leaves sharp; a flowering tree	**TAMARISK**	**(6)**
1. Leaves broad; flowering plants:		
7. Leaves opposite:		
8. Leaves compound (Section II):		
9. Leaves with only 3 leaflets, or twigs large, pithy	**BLADDERNUT, etc.**	**8**
9. Leaves with 5–11 (rarely 3) leaflets; twigs if large, not pithy:		
10. Leaves feather-compound:		
11. Twigs neither densely velvety nor white-powdered (see also Japanese Corktree, p. 52)	**ASHES (1)**	**9**
11. Twigs either densely velvety or white-powdered	**ASHES (2), etc.**	**10**
10. Leaves fan-compound	**BUCKEYES**	**11**
8. Leaves simple (Section III):		
12. Leaves not toothed:		
13. Leaves not heart-shaped:		
14. Leaves with veins that strongly tend to follow leaf edges	**DOGWOODS**	**15**
14. Leaves with veins only slightly if at all following leaf edges:		
15. Leaves thick, leathery	**DEVILWOOD**	**(16)**
15. Leaves thin, not leathery	**FRINGE-TREE**	**16**

	Name	*Plate*
13. Leaves heart-shaped	**PRINCESS-TREE, etc.**	**18**
12. Leaves toothed:		
16. Leaves not lobed:		
17. Twigs 4-lined or buds globular	**MISCELLANEOUS**	**19**
17. Twigs not 4-lined; buds not globular	**VIBURNUMS (1)**	**20**
16. Leaves lobed	**MAPLES**	**22**
7. Leaves alternate:		
18. Leaves compound (Section IV):		
19. Twigs thorny	**LOCUSTS, etc.**	**24**
19. Twigs thornless:		
20. Leaves only once-compound (*leaflets* not divided):		
21. Leaflets 3	**HOPTREE**	**25**
21. Leaflets more than 3:		
22. Leaflets toothed (in Tree-of-Heaven with only 1 basal pair of glandular teeth):		
23. Leaflets 11–41 (rarely 7 or 9):		
24. Buds nearly hidden beneath leaf-stalk bases; sap often milky	**SUMACS**	**26**
24. Buds easily visible (or in Tree-of-Heaven partly hidden):		
25. Buds white-woolly, brown-woolly, or red-gummy	**WALNUTS, etc.**	**27**
25. Buds yellow-hairy or brown-hairless	**PECAN, WATER HICKORY**	**28**
23. Leaflets 5–9:		
26. Leaflets mostly 5–7:	**HICKORIES (1)**	**28**
26. Leaflets mostly 7–9:	**HICKORIES (2)**	**29**
22. Leaflets not toothed:		
27. Bundle scars more than 5	**SUMACS**	**26**
27. Bundle scars 5	**YELLOWWOOD**	**30**
20. Leaves twice- or thrice-compound	**COFFEE-TREE, etc.**	**31**
18. Leaves simple (Section V):		
28. Twigs thorny:		
29. Thorns less than 1″, or if longer then buds not ball-shaped	**OSAGE-ORANGE, etc.**	**38**
29. Thorns mostly over 1″, buds ball-shaped	**HAWTHORNS**	**39**
28. Twigs thornless:		
30. Leaves lobed:		
31. Leaves fan-lobed:		
32. Plants with all leaves lobed	**MISCELLANEOUS**	**42**
32. Plants with some leaves not lobed	**MULBERRIES, etc.**	**43**
31. Leaves feather-lobed	**OAKS (1), (2)**	**45, 46**
30. Leaves not lobed:		
33. Leaf scars with more than 1 bundle scar:		
34. Leaves mostly heart-shaped or triangular, with 3–5 stout veins meeting near leaf base:		

Name *Plate*

35. Bundle scars 3; leaves toothed; bark of young trunks usually smooth whitish- or greenish-yellow; lowermost bud scale in outside position squarely above leaf scar **POPLARS** 44

35. Bundle scars 1 to many, or if 3, then leaves not toothed or pith usually chambered; bark and bud scales not as above **MISCELLANEOUS** 43

34. Leaves neither heart-shaped nor triangular, or if so, with only a single main vein:

36. Twigs with clustered (true) end buds:

37. Acorns or their cups usually present on twigs or on ground; bundle scars 4 or more **OAKS** (3), (4) 47, 48

37. Acorns absent; bundle scars 3:

38. Leafstalks with glands; broken twigs with peculiar sour odor; trunk often with narrow cross stripes **FIRE CHERRY** 53

38. Without these characteristics; swamps from sw. Missouri southward only **CORKWOOD** 59

36. Twigs with single end buds (either true or false end buds):

39. Twigs with completely encircling lines or rings (stipule scars):

40. Leaves not toothed **MAGNOLIAS** 49

40. Leaves toothed **BEECH** 57

39. Twigs without completely encircling lines:

41. Leaves not toothed and not definitely wavy-edged:

42. Buds with a single scale; leaves mostly narrow **WILLOWS** (1), (2) 55, 56

42. Buds without scales or with more than 1 scale; leaves various:

43. Buds without scales:

44. Leaves usually under 6″ long, more or less elliptic or egg-shaped **BUCKTHORNS** 58

44. Leaves usually over 6″ long, wedge-shaped **PAWPAWS** 59

43. Buds with 2 or more scales:

45. Leaf bases uneven **UPLAND HACKBERRY** (43)

45. Leaf bases even **MISCELLANEOUS** 59

41. Leaves with definite teeth or distinctly wavy-edged:

46. Leaves with distinct double teeth:

47. Leaf bases mostly uneven, 1 side much lower than other; buds many-scaled, scales in 2 even rows:

48. Leaves quite long-pointed and usually triangular **HACKBERRIES** 43

48. Leaves not long-pointed, mostly egg-shaped **ELMS** 50

47. Leaf bases mostly even, both sides similar or only slightly uneven:

49. Buds with 2–3 scales, neither hairy

	Name	*Plate*
60. Pith not chambered and buds scaly:		
62. Leaves toothed	**SOURWOOD**	**66**
62. Leaves not toothed:		
63. Leaves mostly triangular, with 3–5 main veins meeting near leaf base	**NEW JERSEY TEAS**	**43**
63. Leaves otherwise	**MISCELLANEOUS**	**68**

APPENDIX D

Key to Trees in Leafless Condition

For use only in identifying specimens at least 25 feet tall, thus excluding shrubs. Plate numbers in parentheses indicate that the plants are included but not illustrated in connection with the plate specified.

Name *Plate*

1. Leaf scars lacking; twigs and needlelike foliage dropping in winter, leaving no leaf or bundle scars; fruits ball-shaped cones **BALDCYPRESS** 3
1. Leaf scars present:
  2. Leaf scars opposite (Sections II and IV):
    3. Leaf scars with 4 to many bundle scars, often large:
      4. Central bud missing, a single pair of buds present at twig tip):
        5. Leaf scars 4-sided to crescent-shaped **BLADDERNUT, etc.** 8
        5. Leaf scars circular or nearly so **PRINCESS-TREE, etc.** 18
      4. 1 or 3 buds present at twig tip:
        6. Twigs moderately slender; end bud of moderate size, with only 2–3 pairs of scales; buds and twigs hairy or hairless:
          7. Twigs neither velvety-hairy nor white-powdered (see also Japanese Corktree, p. 52) **ASHES (1)** 9
          7. Twigs velvety-hairy or white-powdered **ASHES (2)** 10
        6. Twigs stout; end bud often very large, with many scales, and often gummy; buds and twigs mostly hairless **BUCKEYES** 11
    3. Leaf scars with 1 or 3 bundle scars:
      8. Bundle scar 1:
        9. Twigs bright green or red, 4-lined **BURNINGBUSH, etc.** 19
        9. Twigs more somberly colored:
          10. Buds ball-shaped **FORESTIERAS** 19
          10. Buds longer than broad **FRINGE-TREE** 16
      8. Bundle scars 3:
        11. Upper leaf scars meeting in raised points **ASHLEAF MAPLE** 10
        11. Upper leaf scars not meeting in raised points:
          12. Leaf scars much raised above twigs; buds hidden beneath leaf scars in 1 species **DOGWOODS** 15
          12. Leaf scars not much raised; buds visible:

	Name	*Plate*
13. Central bud missing, a single pair of buds at twig tips	**BLADDERNUT, etc.**	**8**
13. 1 or 3 buds present at twig tips:		
14. Buds with a single caplike scale	**BASKET WILLOW**	**56**
14. Buds with 2 or more scales:		
15. Bud scales 2:		
16. Fruits dry, winged; twigs hairy or trunk bark white-striped	**MAPLES**	**22**
16. Fruits fleshy; twigs not hairy; trunk not white-striped:		
17. Leaf scars deeply U-shaped	**JAPANESE CORKTREE**	**(10)**
17. Leaf scars not U-shaped	**VIBURNUMS (1)**	**20**
15. Bud scales 4 or more	**MAPLES**	**22**
2. Leaf scars alternate (Sections I, III, and IV):		
18. Twigs thorny or bristly:		
19. Leaf scars with 1 or with more than 3 bundle scars	**OSAGE-ORANGE, etc.**	**38**
19. Leaf scars with 3 bundle scars:		
20. Thorns in pairs or buds hidden beneath or surrounded by leaf scars	**LOCUSTS, etc.**	**24**
20. Thorns not paired; buds above leaf scars	**HAWTHORNS**	**39**
18. Twigs thornless:		
21. Leaf scars with 4 or more bundle scars:		
22. Buds narrowed at base (stalked):		
23. Buds without scales, red-brown, hairy, end buds longer	**PAWPAWS**	**59**
23. Buds with 2–3 smooth, usually reddish, scales, end buds not conspicuously larger than side buds	**ALDERS**	**51**
22. Buds not conspicuously narrowed at base:		
24. Twigs completely encircled by narrow lines (stipule scars) beneath buds:		
25. Buds with only 1 bud scale or none:		
26. Leaf scars entirely surrounding buds	**SYCAMORE**	**42**
26. Leaf scars, buds adjacent	**MAGNOLIAS**	**49**
25. Buds with more than 1 bud scale:		
27. Buds long-pointed, many-scaled, not aromatic	**BEECH**	**57**
27. Buds blunt, 2-scaled, spicy-scented when crushed	**TULIP-TREE**	**42**
24. Twigs without encircling stipule scars:		
28. Buds clustered at enlarged twig tips	**OAKS** (1)–(4)	**45–48**
28. Buds not clustered at twig tips:		
29. Leaf scars large, triangular or shield-shaped; twigs stout:		
30. End buds true:		
31. Pith chambered; buds woolly	**WALNUTS**	**27**
31. Pith continuous; buds hairy or not	**HICKORIES** (1), (2)	**28, 29**

Name *Plate*

30. End buds false; buds woolly:
32. Buds sunken in bark, often one above the other **COFFEE-TREE** 31
32. Buds not sunken, 1 per leaf scar:
33. Leaf scar 3-lobed; bundle scars in 3 groups **CHINABERRY** (31)
33. Leaf scars deeply triangular; bundle scars scattered **TREE-OF-HEAVEN** 27
29. Leaf scars small or narrow; twigs stout or not:
34. Twigs sandpaper-rough; pith partitioned near each leaf scar **PAPER-MULBERRY** 43
34. Twigs and pith not as above:
35. Buds nearly encircled by U- or V-like leaf scars:
36. Bundle scars usually 5; sap not milky **YELLOWWOOD** 30
36. Bundle scars more than 5; sap milky **SUMACS** 26
35. Buds located above leaf scar:
37. Buds with 4 or more visible scales; sap milky **MULBERRIES** 43
37. Buds with only 2–3 visible scales; sap not milky:
38. Leaf scars narrow; bundle scars in a line; end buds true **MOUNTAIN-ASHES** 27
38. Leaf scars oval or triangular; bundle scars not in a line; end buds false:
39. Twigs stout **CHINABERRY** (31)
39. Twigs slender:
40. Buds red or green, usually moderately sharp; inner bark fibrous **BASSWOODS** 43
40. Buds brownish, usually blunt; inner bark weak **CHESTNUTS** 57
21. Leaf scars with less than 4 bundle scars:
41. Leaf scars with 3 bundle scars (*for alternate 41* see p. 400):
42. Pith chambered:
43. Twigs stout; leaf scars large, shield-shaped **WALNUTS** 27
43. Twigs slender; leaf scars small, not shield-shaped:
44. End buds false; fruits dry when ripe **HACKBERRIES** 43
44. End buds true; fruits fleshy **SOUR-GUMS** 59
42. Pith continuous:
45. Buds without scales, hairy:
46. Buds narrowed at base **WITCH-HAZELS** 57
46. Buds not stalked **BUCKTHORNS** 58
45. Buds with 1 or more scales:
47. Twigs with small yellow resin-dots evident (use lens) **WAXMYRTLES** 57
47. Twigs without resin-dots (use lens):
48. End buds true:
49. Buds with 1–3 visible scales:

	Name	*Plate*
63. Branchlets and buds otherwise:		
64. Older bark usually with narrow cross stripes; broken twigs with unique almondlike odor	**CHERRIES**	53
64. Older bark not cross-striped; broken twigs without special odor	**APPLES**	38, 58
48. End buds false:		
65. Buds with 2–3 visible scales:		
66. Twigs stout, relatively inflexible; leaf scars large; buds small, round:		
67. Buds often several at each leaf scar, above one another:		
68. Buds imbedded in bark; twigs whitish; pith pink	**COFFEE-TREE**	31
68. Buds raised; twigs not whitish; pith whitish	**WESTERN SOAPBERRY**	(30)
67. Buds single, raised; leaf scar 3-lobed; pith white	**CHINABERRY**	(31)
66. Twigs slender, relatively flexible; leaf scars smaller; buds various:		
69. Leaf scars U-shaped; buds hairy	**HOPTREE**	25
69. Leaf scars not U-shaped; buds hairy or not:		
70. Inner bark of branches tough and fibrous; twigs mostly red or green	**BASSWOODS**	43
70. Inner bark of branches not especially fibrous; twigs brownish:		
71. Buds as wide as long	**ALBIZZIA**	31
71. Buds longer than broad	**CHESTNUTS**	57
65. Buds with 4 or more visible scales:		
72. Buds short, blunt, ball-shaped	**HAWTHORNS**	39
72. Buds mostly longer, not ball-shaped:		
73. Leaf scars raised, with 2 obvious lines leading down from sides of their bases:		
74. Leaf scars with upper edge often fringed with hairs; some buds narrow at base; a 3rd line sometimes leading from centers of leaf-scar bases	**REDBUD**	43
74. Leaf scars not fringed; buds not stalked; only 2 lines present:		
75. Buds narrow, often sharp; broken twigs with sour odor; trunk bark often with cross stripes	**PLUMS**	38, 53
75. Buds broad, mostly blunt; broken twigs without sour odor; trunk bark not striped	**PEARS**	58
73. Leaf scars not raised, or at least without obvious lines leading from them:		
76. Scales of buds in regular vertical rows:		
77. Bud scales in 2 rows; buds round in cross section; some species with "winged" branchlets; trunk ridged	**ELMS**	50
77. Bud scales in 4 rows; buds 4-angled; branchlets not winged; trunk smooth, gray, "muscular"	**IRONWOOD**	51

APPENDIX E

Plant Relationships

Although field identification does not require a knowledge of major classification groups or even of family or scientific names, it is desirable to know the general relationships of the various plants. The following list indicates the family relationships of the genera of woody plants. All are members of the Division Spermatophyta, bearing embryo-containing seeds. The closeness of the relationships of the several families is further indicated by the ordinal, subclass, class, and subdivisional groupings. This classification is the one of Engler and Prantl, which is followed by Fernald (see Preface) and other standard references. All major and many minor botanical subdivisions are based mainly on flower and fruit structures. Family names are those ending in *aceae;* names of the orders are here standardized by use of the ending *ales.*

Subdivision GYMNOSPERMAE

Order Coniferales

TAXACEAE: *Taxus*
PINACEAE: *Pinus, Larix, Picea, Abies, Tsuga, Taxodium, Chamaecyparis, Thuja, Juniperus*

Subdivision ANGIOSPERMAE

Class MONOCOTYLEDONEAE

Order Liliales

LILIACEAE: *Smilax*

Class DICOTYLEDONEAE

Subclass **Archichlamydeae**

Order Salicales

SALICACEAE: *Salix, Populus*

Order Myricales

MYRICACEAE: *Myrica, Comptonia*

Order Leitneriales

LEITNERIACEAE: *Leitneria*

Order Sapindales (contd.)

CYRILLACEAE:	*Cyrilla*
AQUIFOLIACEAE:	*Ilex, Nemopanthus*
CELASTRACEAE:	*Euonymus, Pachistima, Celastrus*
STAPHYLACEAE:	*Staphylea*
ACERACEAE:	*Acer*
HIPPOCASTANACEAE:	*Aesculus*
SAPINDACEAE:	*Sapindus*

Order RHAMNALES

RHAMNACEAE:	*Berchemia, Rhamnus, Ceanothus*
VITACEAE:	*Ampelopsis, Cissus, Parthenocissus, Vitis*

Order MALVALES

TILIACEAE:	*Tilia*
MALVACEAE:	*Hibiscus*

Order PARIETALES

THEACEAE:	*Stewartia*
GUTTIFERAE:	*Ascyrum, Hypericum*
TAMARICACEAE:	*Tamarix*
CISTACEAE:	*Hudsonia*

Order MYRTALES

THYMELAEACEAE:	*Dirca, Daphne*
ELAEAGNACEAE:	*Eleagnus, Shepherdia*
LYTHRACEAE:	*Decodon*
NYSSACEAE:	*Nyssa*

Order UMBELLALES

ARALIACEAE:	*Aralia, Oplopanax, Hedera*
CORNACEAE:	*Cornus*

Subclass **Metachlamydeae**

Order ERICALES

CLETHRACEAE:	*Clethra*
PYROLACEAE:	*Chimaphila*
ERICACEAE:	*Ledum, Rhododendron, Menziesia, Leiophyllum, Loiseleuria, Kalmia, Phyllodoce, Andromeda, Zenobia, Pieris, Lyonia, Leucothoë, Oxydendrum, Chamaedaphne, Cassiope, Epigaea, Gaultheria, Arctostaphylos, Calluna, Erica, Gaylussacia, Vaccinium*

Order EBENALES

SAPOTACEAE:	*Bumelia*
EBENACEAE:	*Diospyros*
SYMPLOCACEAE:	*Symplocos*
STYRACACEAE:	*Halesia, Styrax*

APPENDIX F

The Meaning of Botanical Terms

(some with technical equivalents)

See also diagrams and text (pp. xx–xxiii) in "How to Use This Book" chapter.

Aerial rootlet (vine). Small rootlike organs along stems of some climbing vines. See Poison-ivy, Plate 25.

Alternate (leaves, buds). Not opposite, but arranged singly at intervals along twigs.

Angled (twig, bud). With evident ridges; not smoothly rounded.

Aromatic. Having a spicy odor, at least when crushed.

Base (leaf). The lower portion, toward the leafstalk.

Berry (fruit). Strictly speaking, a fleshy fruit that contains small seeds (such as a grape). "Berry" or berrylike fruits are mentioned, indicating fleshy fruits that are not true berries.

Blade (leaf). The broad expanded portion.

Bloom (twig, leaf, fruit, etc.). A whitish powdery coating.

Bract. A somewhat leaflike, petal-like, or woody structure occurring beneath a flower or fruit or their clusters.

Branchlet. Except for the twig, the youngest and smallest division of a branch.

Bristle. A stiff hair, sometimes pricklelike.

Bundle scars. Tiny, somewhat circular dots within the leaf scar, caused by the breaking of bundles of ducts leading into the leafstalk. Sometimes elongate or curved.

Capsule. A dry fruit that splits partly open at maturity.

Catkin. A cluster of tiny flowers or fruits, usually fuzzy and caterpillar-shaped, often drooping. They occur in willows and relatives. Where containing flowers of only 1 sex, male catkins usually are larger.

Chambered (pith). Pith divided crosswise by numerous plates or membranes. Term is here used broadly to include all types of segmented and transversely divided pith (diaphragmed, partitioned). When the twig is cut lengthwise, such a pith looks ladderlike.

Coarse-toothed (leaf edge). With large teeth; dentate, serrate.

Compound (leaf). Divided into leaflets, each of which usually has the general appearance of a leaf. See page xx.

Deciduous (leaf, stipule, bud scale, etc.). Falls off seasonally, usually in autumn.

Double-toothed (leaf edge). Each tooth bearing smaller teeth.

Egg-shaped (leaf). Broader near the base than at the tip, the base broadly rounded (but leaf tip is sharper than apex of an egg); ovate.

Sheath (conifer needle). Thin tissues present at needle bases and binding the needle bundles.

Short-pointed (leaf tip). Abruptly constricted and sharply pointed; not gradually tapering.

Shreddy (bark). Dividing into fragile, thin, narrow sheets.

Shrub. A woody plant usually growing with several equally strong stems and less than about 15 feet maximum height.

Side (buds). In a lateral, not end, position.

Simple (leaf). Composed of only a single blade, though frequently lobed.

Single-toothed (leaf edge). Bearing only a single set of teeth. See also *Double-toothed.*

Sinus (leaf). The indentation between 2 leaf lobes.

Solid (pith). Smoothly pithy, the twig center neither chambered nor hollow.

Species. For practical purposes here: populations whose individuals freely breed with one another and vary only slightly from one another.

Spicy-scented. See *Aromatic.*

Spike (flowers, fruits). A cluster with a narrow, fingerlike shape, the individual flowers or fruits without separate stalks, or with only very short ones.

Spine. A thorn.

Spur branch. A stubby branchlet with densely crowded leaves and leaf scars. See drawing, Plate 38.

Stalked (buds). Having a narrow necklike base.

Sterile (flower). Infertile, unproductive.

Stipule. A growth at the base of the leafstalk, usually small and in pairs, leaving scars on the twig when they drop. See also *Ringed.*

Stolon. See *Runner.*

Straggling. Semi-upright.

Tendril (vine). A clasping, twining, slender outgrowth of the stem.

Thorn (twig, branchlet, branch, stem). A stout, sharp, woody outgrowth of the stem. Technically, prickles are of different origin, but this book does not require a distinction to be made.

Thrice-compound (leaf). Divided into leaflets that in turn are divided into leaflets, and they further divided into subleaflets; an uncommon type.

Tip (leaf). The apex.

Trailing (stem). Lying prostrate on the surface or on other vegetation.

Tree. A woody plant usually with a single main stem and generally growing more than 20 feet tall.

Trunk. The large main stem of a tree.

Tubular (flower). With the basal portion hollow and tubelike.

Tundra. Vegetation type of very cold climates, especially in Far North, overlying permafrost and consisting of lichens, sedges, mosses, grasses, and low woody plants.

Twice-compound (leaf). With the leaflets again divided into leaflets.

Twig. The end subdivision of a branch; the current year's growth.

Twining (stem, leafstalk). Clasping by winding around.

Variety. That portion of a species which in a certain geographic area differs slightly from the remainder of the species elsewhere.

Wavy-edged (leaf edge). With shallow, rounded undulations.

Wavy-toothed (leaf edge). Wavy-edged but with more toothlike projections; crenate.

Wedge-shaped (leaves, leaf bases, leaf tips). With narrow, tapering bases or, less often, tips (cuneate, acute).

Whorled (leaves, leaf scars). Arranged in circles around the twigs.

Winged (leafstalk, twig). With projecting thin flat membranes or corky outgrowths.

Woody plant. With the stems and limbs containing lignin (wood).

Index

THIS index refers to silhouettes (*italic* numbers), text descriptions (roman lightface), and legend pages opposite the Plates (**boldface**); silhouettes are listed only after the common names. Alternate vernacular names are given as *See* references. Each species or group of similar plants also is mentioned in the Key at the beginning of its Section (I–V). Broad-leaved plants also are listed either in Appendix A or B, and if they are trees are further included in either Appendix C or D. All such Key references are by common name and are not included in the index. Generic names are classified according to taxonomic relationship in Appendix E. Names of families and higher categories, as well as plants mentioned under the *Similar species* subentry but not described elsewhere in the book, are included in the index.

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